Rocky Mountain Remediation Services, L.L.C.
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DECOMMISSIONING OPERATIONS PLAN

(DOP)

FOR THE BUILDING 779 COMPLEX

December 18, 1996

(DOP)
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1.0 INTRODUCTION HISTORY/BACKGROUND

1.1 INTRODUCTION

The end of the Cold War moved the Department of Energy's Focus from nuclear weapons production to the stabilization and clean-up of previously operating facilities Many production facilities that once operated with a high priority, are now considered surplus or excess facilities In 1992 the Department of Energy (DOE) established the Office of Nuclear Material and Facilities Stabilization (EM-60) to oversee and coordinate the orderly transition of these surplus facilities from Defense Program (DP) operations to a new mission

The strategy of DOE is to deactivate surplus facilities on a priority basis and place as many facilities as possible in a safe, stable condition This will lower the mortgage costs by minimizing or eliminating the need to maintain the surveillance and maintenance (S&M) of these facilities Eventually the facilities will be sold to the private sector for further use or the facility will be decommissioned The DOE decommissioning approach considers cost effectiveness and risk reduction in completing material stabilization and deactivation activities The DOE plan requires clear endstate determinations which are to be achieved by using a cost effective approach managed within a projectized framework to complete the selected decommissioning activities

The Rocky Flats Environmental Technology Site (RFETS) facilities are a part of this transition of DOE mission On July 19, 1996 the Rocky Flats Clean-up Agreement (RFCA) was signed by DOE, Colorado Department of Public Health and Environment (CDPHE) and the Environmental Protection Agency (EPA). RFCA is the document which will govern the clean-up and decommissioning of the RFETS facilities The RFCA requirements for decommissioning at RFETS are being implemented by Kaiser Hill in their Decommissioning Program Management Plan and Department of Energy's (DOE) Decommissioning Program Plan (DPP). This Decommissioning Operations Plan for the Building 779 Complex is the project plan which is used to describe how the RFCA and DPP requirements will be implemented to complete the Building 779 Cluster Decommissioning Project. The Building 779 Cluster Decommissioning Project will be completed over a three year time frame

1.2 HISTORY OF BUILDING PROCESSES

1.2.1 Building 779

Building (779-A) was originally constructed in 1965, with additions in 1968 and 1973 The additions are referred to as Building 779-A (sometimes as 779-2), and Building 779-B (sometimes as 779-3) Since all three buildings are physically connected, and share resources and mission, any reference to Building 779 should be understood to include all three buildings

The first addition to Building (779-B) was completed in 1968 The addition added office space, laboratory area dedicated to pyrochemical technology, hydride operations, physical metallography, joining technology, and the necessary HVAC equipment to supplement the existing HVAC system The 1968 addition is a single story facility attached to the north end of Building 779

The second addition to Building 779 gave the building the ability to perform long term environmental evaluations of production parts The building facilities had lab equipment to subject production parts to harsh environmental conditions and included the chemical and physical analysis equipment required to evaluate any changes in the production parts The 1973 addition is a two story facility added to the south side of the original Building 779 Although both additions are architecturally and structurally different from the original Building 779, they are functionally tied to the original building

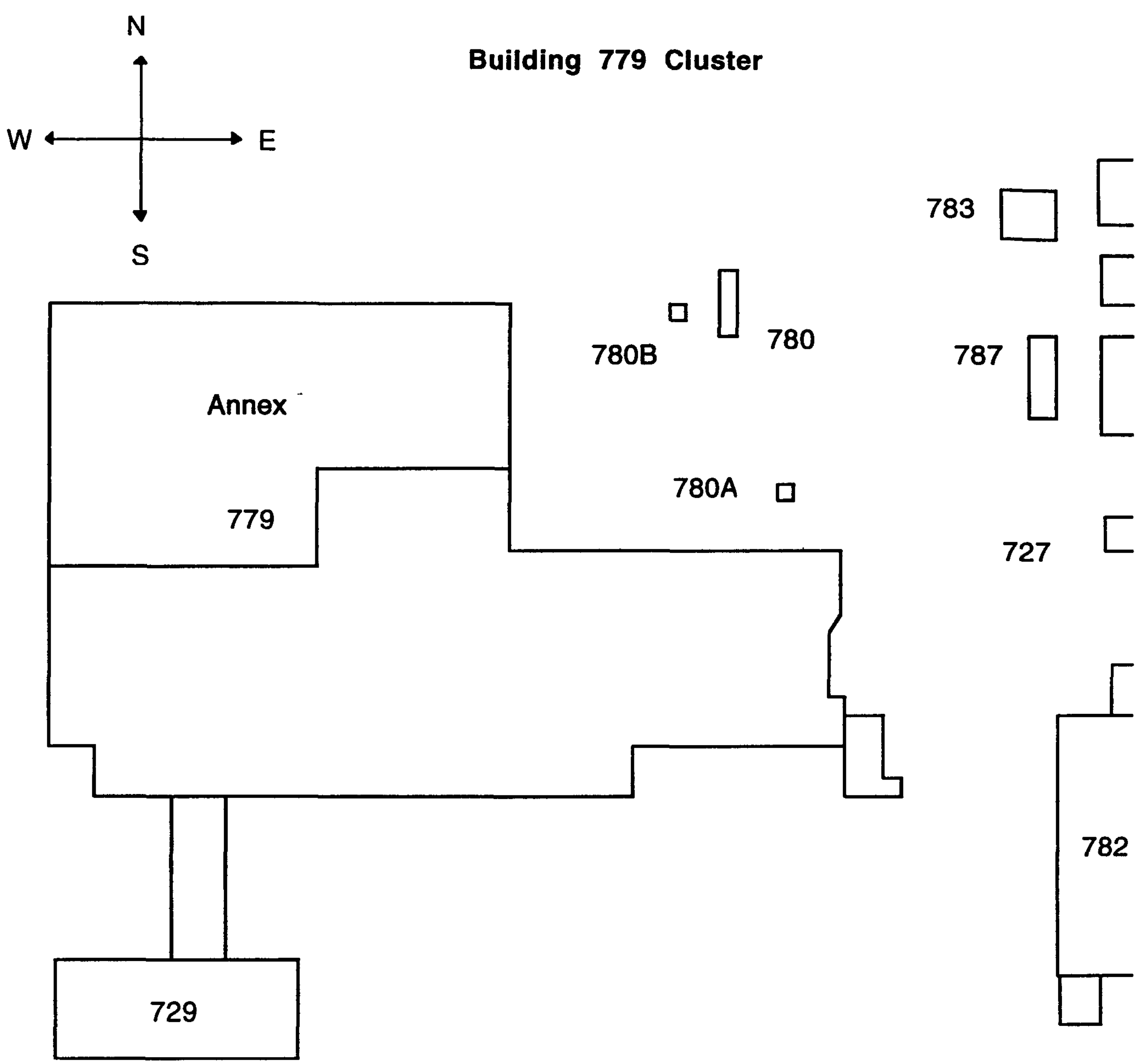
The mission of Building 779 was primarily as a research and development (R&D) center, and an analytical lab in support of Pu operations. The Building did perform a limited amount of production activities. The major thrust of the R&D effort was metallography and welding, with the lab concentrating on metal analysis

The building itself consists of three types of construction, concrete columns, structural steel columns, and concrete block/plaster. Exterior walls are concrete block, except for metal siding used on a storage area on the east side, and reinforced concrete walls around the storage vault In 1988 several sections of the building were reinforced with concrete buttresses for greater wind and earthquake loading The roof of the single story portion is structural steel with steel decking, insulation and then composition roofing The two story roof portion uses poured-in-place, reinforced concrete slabs, with foam and silicone rubber roofing The roof of the first addition consists of pre-cast concrete tees with pearlite and elastomeric roofing The foundation consists of reinforced concrete beams resting on reinforced concrete footings The ground floor has 42,800 square feet, the second floor has 24,370 square feet and the basement has 540 square feet for a total of 67,710 square feet

1.2.1.1 Building 779 Support Facilities (See Figure 1 1)

Along with the two building additions, two filter plenum buildings were constructed after Building 779 was completed Building 729 was constructed in 1971, and contains as a filter plenum and emergency electrical power Building 729 is connected to Building 779 via a second story bridge Building 729 has dimensions of 72ft x 38ft and is located immediately south of Building 779 Building 782 was constructed in 1973, and serves as the second filter plenum for Building 779 Building 782 covers 60 feet x 99 feet and is located east of Building 779 The emergency generator for Building 782 was located in the separate Building 727, located north of Building 782

Building 780 is a corrugated metal shed attached to the northeast corner of Building 779 It has been used to store paint, solvents, miscellaneous equipment, and material Building (780-A) is another storage facility located east of Building 779 which is constructed of corrugated steel There are no utilities or fire protection associated with this facility Building (780-B) is an additional corrugated steel storage building located east of Building 779 This building was used to store gas bottles



727	Emergency diesel generator facility serving Building 779
729	Facility containing filter plenums and emergency diesel generator
779	Research and Development Center
780	Paint/Storage Facility
780A	Metal Storage Facility
780B	Gas Bottle Storage Facility
782	Filter Plenum Exhaust Enclosure For Building 779 Exhaust
783	Building 779 Cooling Tower Pump House
784	Building 779 Cooling Tower Support Facility
785	Building 779 Cooling Tower Support Facility
786	Building 779 Cooling Tower West Chiller
787	Building 779 Cooling Tower East Chiller

Figure 1.1

The following buildings are located adjacent to each other, north-east of Building 779, and north of Building 727

Building 783 - Cooling Tower Pump House
Building 784 - Cooling Tower
Building 785 - Cooling Tower
Building 786 - Cooling Tower West Chiller
Building 787 - Cooling Tower East Chiller
Building 780 - Paint/Storage Facility
Building 780-A - Meatl Storage Facility
Building 780-B - Gas Bottle Storage Facility

1.2.2

This section describes the research, development, and support operations currently conducted in Building 779 Operations are separated into five areas of responsibility

1 Process Chemistry Technology

2 Physical Metallurgy

3 Machining and Gaging

4 Joining Technology

5 Hydriding Operations

Because research operations were constantly changing during facility operations, only a general description of them is provided

1.2.2.1 Process Chemistry Technology

The chemistry laboratories in Building 779 were engaged in weapons process development, stockpile reliability testing, and methods development for recovering, separating, and purifying actinides from waste streams and residues Some research activities and operations were performed on a continuous basis in production-scale facilities Other activities were short-term and were performed on a laboratory scale using more highly specialized equipment

Actinide elements, compounds, and other radioactive materials encountered include the following isotopes and other associated trace isotopes or radioactive decay products.

- Americium
  Am-241
- CobaltCo-60
- Strontium~Yttrium
  Sr-90/Y-90
- Plutonium
  Pu-238
  Pu-239
  Pu-240
  Pu-241
  Pu-242
- Thorium
  Th-232
- Tritium
  H-3
- Uranium
  U-235
  U-238

Chemicals not used in other parts of Building 779 were used in Process Chemistry Technology operations. They included elemental iodine hydrazine, dimethylamine, ammonium hydroxide, soda lime, hydrochloric acid, alkali metals and compounds, and hydrogen

1.2.2.1 Ion Exchange

Ion exchange resins were tested for the purification and separation of plutonium from other actinides Purified plutonium eluate was returned to production for conversion to plutonium metal. Safe control of the ion exchange processes required proper sequencing of column feed adjustments, open-end columns for protection from pressure, specific instructions for eluting before the end of a work shift and never allowing resin to dry (nitrated dry resin is unstable), and safe-diameter columns and storage vessels

1.2.2.1 Precipitation

The plutonium peroxide precipitation and calcination process was simulated on a laboratory scale The process converted plutonium solutions to a plutonium peroxide precipitate The precipitate was then calcined to a plutonium oxide powder, which is transferred to Building 771 for reduction to metal The process required critically safe operating and storage vessels

1.2.2.1 Thermodynamics

Thermodynamics studies of nuclear materials were conducted on a laboratory scale Experiments involved measurement of chemical energy changes associated with certain chemical reactions, as well as the determination of heat capacities and enthalpies of nuclear materials, some of which were radioactive

Solvent extractants were tested for the separation and removal of actinides from acid and salt wastes. Aqueous and organic wastes were transferred to Waste Operations for disposal Solvent extraction involved contacting aqueous and organic phases in small vials and uses nonfriable or high-flashpoint solvents for safety

1.2.2.1 Thermogravimetric Analysis

Equipment is in place which was used for characterizing solids and their interactions and reactions with solids and vapors at subatmospheric pressure and at subzero, ambient, and high temperature These capabilities used both vacuum microbalances and differential thermal analysis and thermogravimetric equipment Specific measurements included (1) determining surface area of powders, (2) measuring adsorption and desorption of gases from solid surfaces, (3) measuring the kinetics of solid-gas reactions, (4) measuring equilibrium vapor pressures, and (5) defining the pressure-temperature composition relationships and phase equilibria of solid-gas systems Radioactive, nonradioactive, and air sensitive materials were studied Sample sizes were generally less than 5 grams

1.2.2.1 Surface Studies

Methods used to study the surface of solid samples included auger electron spectroscopy, low energy electron diffraction, electron spectroscopy for chemical analysis, and ellipsometry Both radioactive and nonradioactive materials were examined

1.2.2.1 Radiation

Effects of radiation on various solids, liquids, and gases were considered, using gamma, beta, and alpha irradiation sources These studies determined the radiation stability of materials used in a number of production operations at Rocky Flats Detailed planning of experiments, use of protective equipment, and radiation shielding helped ensure the safety of these experiments

1.2.2.1 Compatibility

Compatibility and chemical studies were performed with plutonium and uranium samples Equipment used in these tests included pressure volume-temperature systems, dynamic gas analyses systems, and high vacuum, gas, and acid-handling systems The laboratory performed kinetic tests and, using gravimetric methods, tests for corrosion These sometimes involved chemical reagents not normally used in other operations in the building

Experiments were carefully planned to ensure that they are conducted safely The systems used were leak and pressure tested The systems had burst discs, check valves, and in-line particulate filters. Experiments were conducted in gloveboxes having atmospheres with less than 3% oxygen Adequate radiation shielding was provided

1.2.2.1 Product Testing and Surveillance

This area included process development research, production support experimentation, and stockpile reliability evaluations Process development was performed in response to design agency guidance related to various phases of weapon cycle use (production, stockpile, deployment, command and control, surveillance, and site-return evaluation) These processes, typically, involved coupon-size samples used for determining reactivity and reaction mechanisms

Production support experimentation was typified by testing of materials proposed for production use Each material was tested for compatibility with war reserve metals and other production materials before it was approved Experimentation for these determinations was performed using small samples that were stored for several weeks Full scale pit testing was performed in response to specific design agency requests

Product was tested under a variety of field-simulated conditions of temperature, pressure, and chemical environment This area of work included short-term operational cycle experiments, as well as accelerated aging studies and subzero temperature shelf-life testing

Operational-cycle-experiments were done under controlled conditions using gas-tight, vacuum and high pressure metallic systems Product aging and shelf-life testing were accomplished in a DOE-approved nuclear materials storage and vault facility.

1.2.2.1 Evaporative Separation

A high-temperature furnace was used to develop methods for distillation of salts and volatile metals from plutonium and americium alloys and residues. Volatile metals were mostly zinc and magnesium. This process was a tool for purifying alloys and upgrading salt residues

This system used (1) electrical cables and connectors that are properly shielded and insulated, (2) automatic pressure control for the furnace, (3) a nitrogen glovebox atmosphere, (4) radiation shielding, (5) overheat detectors, and (6) alarms

1.2.2.1 Pyrochemical Processes

Pyrochemical Process Development was associated with production equipment and production process applications of the pyrochemical techniques This group experimented with molten salt extraction, salt sparging, direct oxide reduction, and electrorefining

Molten salt extraction was performed to remove impurities (i e , undesirable radionuclides) from Rocky Flats plutonium The molten salt extraction operation was performed at an elevated temperature to melt the plutonium metal Molten metal was combined with a salt mixture that contained magnesium chloride, which served to oxidize the impurities in the plutonium metal Once molten, the mixture is separated into a salt phase (which contains the impurities) and a metal phase. Upon cooling, the salt was removed and processed for reuse The purified plutonium button was returned to production

Spent salts from molten salt extraction were melted and combined with calcium metal to reduce the plutonium and americium contained in the salt to pure metal form A calcium/plutonium/americium alloy resulted, along with the purified salt The salt was either reused or discarded if plutonium levels were low enough The metal alloy button was further treated by vacuum melting, which drove off the more volatile nonradioactive metal components, resulting in a purified plutonium/americium button, which could be separated by a variety of processes, including molten salt extraction as described above

Direct oxide reduction was a one-step process for converting plutonium oxide into plutonium metal PuO2, calcium chloride, and calcium metal were placed into a crucible and melted The molten mixture was stirred to allow the reduction reaction to take place The molten products were then poured into mold and allowed to cool Breakout of the cooled contents yielded a plutonium metal button and a discardable salt

Electrorefining was another method of plutonium purification based on the mobility of plutonium ions in the presence of an electric current. Plutonium was heated to a molten state in the presence of molten salt A direct current source is applied to the molten mixture through a tantalum anode placed in the mixture The molten metal mixture acted as the anode. Plutonium ions collected at the cathode and were reduced to pure plutonium metal Impurities remained in the molten salt phase. The resultant plutonium metal was returned to production, and the spent salt was sent to salt sparging for reprocessing.

1.2.2.2 Physical Metallurgy

Physical Metallurgy conducted research on various metals, alloys, and materials required by plant missions. The group also supported different research groups, design agencies, plant production, and others in metallurgical studies of materials and manufacturing techniques for components and processes. Support operations by the group included optical and electron metallography, microprobe analysis, X-ray diffraction, tensile testing, hardness testing, and dilatometry.

Physical Metallurgy personnel experimented with small samples of metals, such as plutonium, uranium, beryllium, steel alloys, copper, and various ceramics and glasses Laboratories with gloveboxes were used for handling radioactive materials. Tensile testing and electron metallography facilities were housed in special laboratory rooms Below are some of the operations conducted by this group

1.2.2.2.1 Optical and Electron Metallography

Analysis of materials was made by examining their structures with light and electron microscopes Gram samples, which were usually mounted in plastic holders, were prepared by cutting or sawing Several cutting and sawing devices were used Beryllium and depleted uranium were handled in machines with hoods and air exhausts for protection against toxic dust and fumes while plutonium samples were handled in gloveboxes Cutting fines were collected and stored in a drum, which was sent to Building 774 for disposal

Materials in plastic mounts were usually ground and polished in specialized metallographic equipment to yield a polished surface for examination Grinding was performed wet and the fines were constantly flushed into the process waste drain. Usually, a chemical treatment followed to reveal the structure in detail Specimens were then examined in appropriate micro-scopes The internal structure of some materials was studied by preparing thin films of the material, and passing an electron beam through the film Specimens were returned to the originator, waste material was disposed of in waste collection drums

1.2.2.2.2 Microprobe Analysis

Samples of materials prepared metallographically, including freshly polished and clean plutonium, were inserted in the microprobe chamber An electron beam scanned across the specimen was used to obtain a chemical analysis by determination of the spectra that were collected

1.2.2.2.3 X-Ray Diffraction

The atomic crystal structure of materials was examined by the use of X-ray diffraction Technical information was obtained by such X-ray studies. Specimens of up to a few grams were placed in the X-ray beams. Radioactive materials were covered with a thin plastic film for protection against contamination.

1.2.2.2.4 Mechanical Testing

The mechanical behavior of radioactive or fissile materials was determined by use of a testing machine enclosed in a glovebox. Nonradioactive materials were tested in open machines. Materials were evaluated by the application of tensile, compressive, and shear loading Relatively small machined specimens were used for testing. Radioactive materials were handled according to appropriate safety procedures.

1.2.2.2.5 Dilatometry

Dimensional changes of a material were measured by use of a dilatometer that detected these changes as the material was heated and cooled Machined specimens were small, and radioactive materials were tested in this system The dilatometer was contained within a glovebox

1.2.2.3 Machining And Gaging

Machining operations within the buildings were conducted in three shops, two general machine shops and a general machining laboratory located in original Building 779 and in Building 779-2

One general machine shop supports Joining Technology. The work consisted of making tooling, fixtures, and special order parts of steel, cast iron, and other common materials Shop equipment included lathes, mills, tool grinders, a belt sander, and a power hack saw Standard shop practices, monthly safety inspections, and trained operating personnel provided a safe working environment Only non-nuclear material was handled (excluding beryllium)

The second general machine shop was a maintenance shop used in support operations It is equipped with a lathe, mill, drill press, and tool grinders General machining tasks employed common materials such as aluminum, brass, copper, and steel Again, only non-nuclear materials are handled

The general machining laboratory was used for high-precision machining of special orders, machining tests, and general machining jobs It was equipped with a direct numerically controlled lathe, tracer lathe, straight lathe, mill, jig borer, drill press, electrodischarge machine, bandsaw, surface grinder, monoset grinder, and tool grinders Waste generated in the machining of common materials was collected in drums in each shop and disposed of according to written procedures.

1.2.2.3.4 Joining Technology

Joining Technology activities were conducted in original Building 779 and in Building 779-2 There was only one Joining area for the handling of nuclear material, which was in Building 779-2 Joining activities included electron-beam welding, gas-tungsten-arc welding, pressure gas-metal-

arc welding, gas welding, brazing, metallography, machining, dimensional inspection, and electronics development

The Coatings facility in Building 779, has three hot-hollow cathode systems and associated hardware. The function of this facility was to define the required parameters associated with the deposition of various materials onto specified substrate geometries. The material most often deposited is silver However, other materials, such as gold, silicon dioxide, and silicon monoxide, were also deposited.

Substrate materials were usually Vascomax, steel, stainless steel, beryllium, and uranium-238, in a variety of forms At no time were the substrate materials mechanically worked on, as in sectioning or grinding, in this facility Coatings were deposited onto the substrates in a closed chamber and under partial vacuum

Each of the hot-hollow cathodes was contained in a separate high-vacuum chamber For any one system, vacuum pumps, gages, and necessary electronics were housed in a cabinet that also doubled as a table surface for the vacuum chamber

There are, at present, two power supplies being shared among the hot-hollow cathodes Both power supplies are enclosed in cabinets with safety interlocks on the panels and doors Although on-off switches are mounted on the cabinets, breaker switches on the wall are used as an additional precaution in initiating and shutting off current to the power supply

Hazardous materials used in the Coatings facility were methanol, nitric acid, and sodium hydroxide These materials were present in small quantities Care is taken to follow OSA requirements when installing and maintaining equipment or when handling any hazardous materials

1.2.2.3.5 Hydriding Operations

Hydride Operations received parts with recoverable plutonium, and through the process of hydriding, removed plutonium from the part in the form of plutonium hydride This hydride was then dehydrided and converted to plutonium metal or oxidized to plutonium oxide

In the hydriding process, the procedure can vary depending upon the material being processed, however, the general procedure is outlined below The part was placed in the hydriding vessel, which was evacuated and backfilled with pure hydrogen In the hydriding reaction, the hydrogen gas in the vessel was consumed in the reaction; therefore, hydrogen was continuously added by an automatic controller to maintain proper operation pressures

Upon completion of the reaction, the hydride was placed in the oxidation reactor Oxidation occurred by passing air through the oxidation reactor When oxidation was complete, the material was burned in the presence of pure oxygen, to ensure that all the hydride was converted to oxide

Since the above reactions involved high temperatures, pyrophoric materials, and potentially explosive gases, several safety systems were designed to prevent any adverse consequences Both reaction vessels are contained within a glovebox that is inerted with argon This glovebox was monitored for high oxygen and hydrogen concentrations Additionally, the electrical design of the system made it impossible to perform the hydriding and oxidizing operations simultaneously Finally, if the pressure of the glovebox exceeded a set pressure, a pressure-relief valve would open, allowing pressurized gases to be exhausted through the hydrogen burning glovebox

1.2.2 HISTORY OF PROCESSES CONDUCTED IN BUILDING 779

1.2.3 BACKGROUND

The various building systems and equipment operations are described in Appendix A

2.0 BUILDING 779 DECOMMISSIONING ORGANIZATION AND RESPONSIBILITIES.

2.1 ORGANIZATION

The Building 779 Decommissioning activities will be controlled within a project organization as illustrated in Figure 2 1 The personnel assigned to the various positions discussed in this section are matrixed from their respective support organization to work within the project organization The matrixed individuals maybe assigned part time or full time depending on the requirements of the project The project personnel report to the project manager for all project related matters If technical issues can not be resolved within the project organization, additional assistance will be requested from support organization(s)

2.1.1 Project Manager (PM)

The Building 779 Cluster Decommissioning Project Manager reports to the Engineering/Construction/Decommissioning (E/C/D) Manager and is responsible for overall management of the project. To carry out this function he is responsible for and has the authority for the development, execution, supervision, coordination and integration of all aspects of the decommissioning project's planning, staffing, management and operations activities

Typical decommissioning activities which will be managed within the project include the following

- Establishing a training requirements matrix and identifying responsibilities to ensure project personnel are properly trained.
- Establishing/verifying industrial and radiological safety plans and controls are in place to support the projects activities.
- Verify project support is available to ensure project activities are completed in accordance with applicable quality assurance requirements
- Establish a mechanism to have periodic quality assessments of the projects records and activities
- Establishing a cost control program which will adequately collect project costs to ensure proper fiscal management of the project
- Verify/establish interface with Radioactive Waste Management organization to ensure the project is supported, so that, the projects' waste is properly inspected, packaged, assayed, stored and available for off site shipment
- Direct the project team to implement the execution of project planning and field activities
- Delegate responsibilities for achieving specific technical criteria, completing required reviews, and other related activities to project personnel
- With the assistance of project team members, establish the detailed scope and sequence of work
- With the assistance of applicable project team members, develop the project budget and schedule

- Establish/verify mechanism to obtain reports for analyzing project costs and schedule Take appropriate action to minimize cost and schedule variances
- Maintain chronological record of the project's history
- The Project Manager is also the Facilities/Building Manager as assigned responsibilities in the RFETS Conduct of Operations Manual (COOP)

2.1.2 Radiation Protection and Occupational Safety Officer (RPOSO)

The RPOSO reports to the Building 779 Cluster Decommissioning Project Manager for priorities of day to day project related activities The RPOSO also maintains a direct reporting relationship to the RMRS Health and Safety Manager for ensuring overall building and project Health and Safety requirements are met. This includes Radiological Control Manual (RCM) requirements. This duel reporting relationship will help maintain independence of perceived project pressures due to schedule and funding demands

The RPOSO (Radiation Protection and Occupational Safety Officer) responsibilities include

- Monitoring/Review of building and project safety criteria to ensure activities are being completed within the correct authorization basis.
- Complete ALARA reviews with assistance of project Radiation Engineers
- Ensure OSHA requirements are factored into project work packages
- Coordinate activities and priorities of Radiation Engineers (RE) and Radiation Operations (RCT) personnel. Resolve conflicts which may arise between RE and RCTs
- Ensure adequate preparation and review of radiation work permits
- Ensure compliance with applicable waste packaging requirements
- Coordinate the completion of routine building radiation surveys and project related surveys and characterizations
- Assist in developing final survey requirements to ensure compliance with RCA and RFETS procedural release criteria requirements
- Maintain/Manage & verify quality of all radiological data
- Coordinate completion of final characterization surveys

2.1.3 Decommissioning Construction Management Superintendent

The Decommissioning Construction Management Superintendent reports to the PM and is responsible for managing the decommissioning team, (labor and supervision) in completing the decommissioning activities which include the decontamination of surfaces, structures, materials, and equipment, the decommissioning activities of any sub-contract work, the movement, packaging and storage of wastes on-site, the monitoring of performed work against plan and for maintaining time records of the operating staff The Decommissioning Construction Management Superintendent is also responsible for ensuring that activities are performed in accordance with applicable IWCP procedures, including tasks plans, radiation work permits, and safety requirements

Specific tasks assigned to the Decommissioning Construction Management Superintendent are

- Review of project scoping and engineering design documents, (i e EOs, HASP, IWCPs, Characterization Records),
- Review and approval of pre-evolution requirements including job safety analysis, RWPs training documentation, sub-contractor planned activities
- Compliance with Conduct of Operations during field operations
- Maintaining daily log book
- Reviewing out of tolerance documentation
- Ensuring personnel maintain required training certification
- Conducting plan of the day/plan of the week meetings
- Completing occurrence notifications
- Providing support for development of compliance documentation and project close-out.

2.1.4 Project Administrator

The Project Administrator reports to the Project Manager The Project Administrator is responsible for establishing and maintaining the project files which will include all documentation relating to the project The Project Administrator will also provide clerical and secretarial help to the project manager

2.1.5 Project Cost and Schedule

The Project Cost and Schedule Lead reports to the Project Manager and is responsible for establishing, maintaining, and reporting project cost and performance utilizing the computerized Primavera system. The project cost and schedule Lead is responsible for generating status reports and schedules as requested by the Project Manager

2.1.6 Quality Assurance Engineer

The QA Engineer receives direction from the PM regarding project priorities QA Engineer reports to and receives overview from the QA Manger. The QA Engineer is responsible for performing assessments and surveillance of project activities, inspections of selected activities, assists in training project personnel on quality control requirements, concurrence of the disposition of non-conformance reports and reviews of project procedures for quality requirement by providing quality related input The QA Engineer is also responsible for initiating discrepancy reports, non-conformance reports, corrective action requests, and reviewing worker training records to ensure workers are appropriately trained.

2.1.7 Project Engineer (PE)

The PE is *responsible for completing engineering activities supporting the decommissioning* project The PE is responsible for complying with Engineering Department Procedures applicable to the project scope of work He/she receives daily project direction from the PM and reports to the Engineering Manager for technical overview

Responsibilities include the following
- Developing, reviewing, and approving reports and studies for technical quality
- Developing, reviewing, and approving project specifications and material requisitions
- Approval disposition of non-conformance reports
- Writing and approving design changes (Field Change Requests/Field Change Notices, FCR/FCN) required during the decommissioning project
- Exercises operational supervision over the engineers of all disciplines assigned to the project or in support of the project
- Directing and coordinating engineering activities for the project
- Assistance in establishing the detailed project scope, work plans and procedures.
- Developing, reviewing and approving engineering orders (EOs) and IWCP work packages
- Reviewing engineering and IWCP work packages to ensure they are in conformance with applicable administrative requirements.
- Compilation of BOM and oversite of Procurement activities

2.1.8 Decommissioning Operations Superintendent

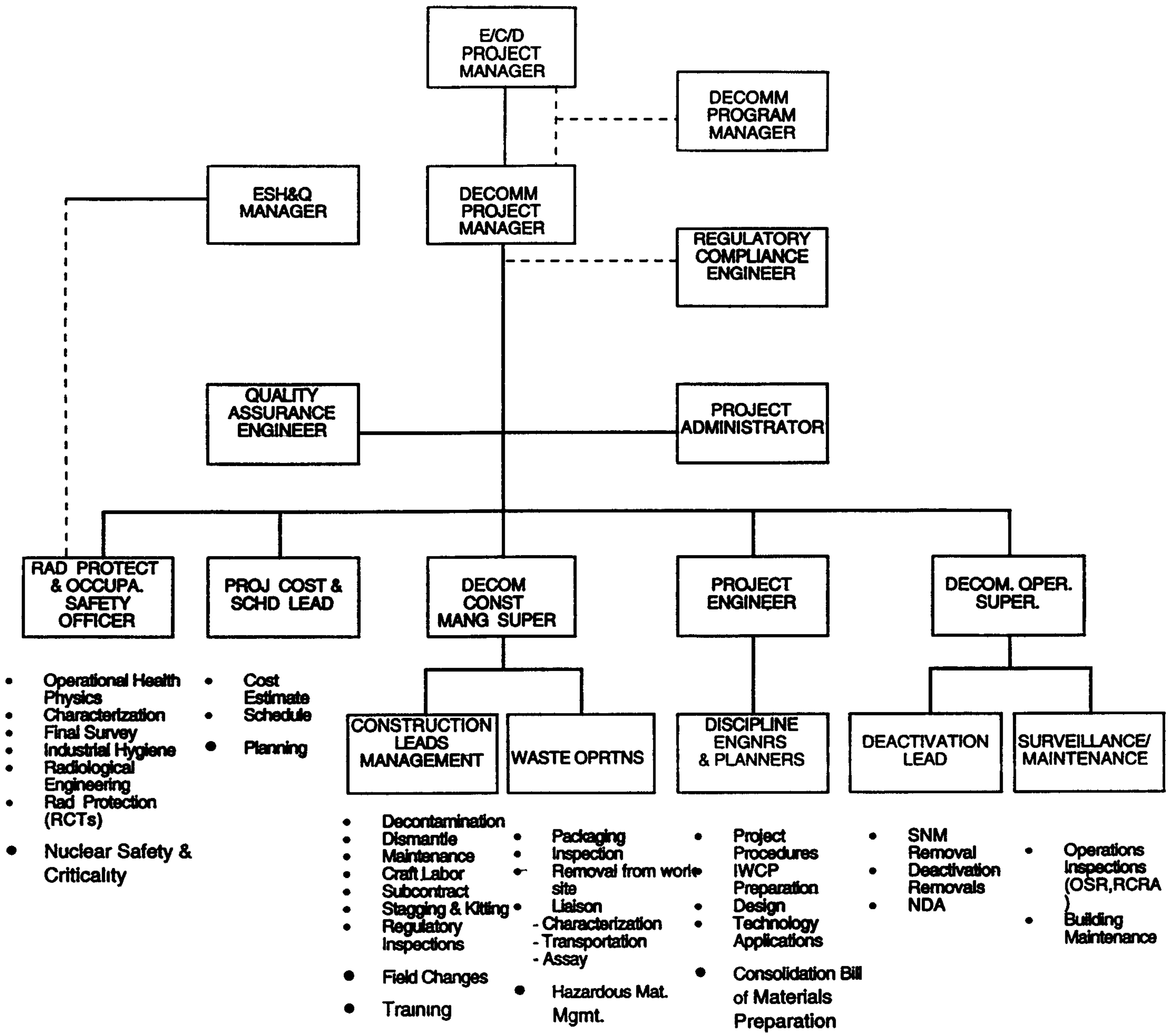
The Decommissioning Operation Superintendent reports to the Project Manager and is responsible for

- Scheduling all surveillance and RCRA inspections
- Completing any operations surveillance or requirement inspections.
- Coordinating any building maintenance with decommissioning activities
- Coordinating deactivation activities with decommissioning activities
- Coordinating NDA analysis with other building activities
- Coordinating special nuclear material consolidation activities with other building activities
- Coordinate and maintain all shift manager responsibilities
- Maintain lock out/tag out log
- Ensure compliance with Conduct of Operations requirements

2.1.9 Regulatory Compliance Engineer

The Regulatory Compliance Engineer reports to the Project Manager and is responsible (working with the PM) to ensure the project activities are conducted in a manner to maintain compliance with all environmental and regulatory requirements as identified in RFCA and Section 8 of this document The Regulatory Compliance Engineer will review all IWCPs and work processes to ensure the projected work can be completed within existing permit requirements or he will have the permits issued/ modified to include the proposed work

The Regulatory Compliance Engineer is the Project Managers' primary interface with state and federal regulations The Regulating Compliance Engineer will track all regulatory commitments and coordinate their completion


E/C/D PROJECT MANAGER
DECOMM PROGRAM MANAGER
ESH&Q MANAGER
DECOMM PROJECT MANAGER
REGULATORY COMPLIANCE ENGINEER
QUALITY ASSURANCE ENGINEER
PROJECT ADMINISTRATOR
RAD PROTECT & OCCUPA. SAFETY OFFICER
PROJ COST & SCHD LEAD
DECOM CONST MANG SUPER
PROJECT ENGINEER
DECOM. OPER. SUPER.
CONSTRUCTION LEADS MANAGEMENT
WASTE OPRTNS
DISCIPLINE ENGNRS & PLANNERS
DEACTIVATION LEAD
SURVEILLANCE/ MAINTENANCE
• Operational Health Physics
• Characterization
• Final Survey
• Industrial Hygiene
• Radiological Engineering
• Rad Protection (RCTs)
• Nuclear Safety & Criticality
• Cost Estimate
• Schedule
• Planning
• Decontamination
• Dismantle
• Maintenance
• Craft Labor
• Subcontract
• Stagging & Kitting
• Regulatory Inspections
• Field Changes
• Training
• Packaging
• Inspection
• Removal from work site
• Liaison
- Characterization
- Transportation
- Assay
• Hazardous Mat. Mgmt.
• Project Procedures
• IWCP Preparation
• Design
• Technology Applications
• Consolidation Bill of Materials Preparation
• SNM Removal
• Deactivation Removals
• NDA
• Operations Inspections (OSR,RCRA)
• Building Maintenance

3.0 DESCRIPTION OF PLANNED ACTIVITIES

3.1 DECOMMISSIONING OBJECTIVES

The objective of the Building 779 Cluster Decommissioning Project is to remove all the building structures within the building cluster and leave the foundations, (which have been decontaminated to meet the end point criteria specified in section 4 0)

3.2 DECOMMISSIONING ACTIVITY OVERVIEW

The following list describes the general types of activities which will be completed within the Building 779 Cluster·

Note: Not all activities will be required in every area. The type of hazards which may create a need for special consideration (requirements) specific to a particular area/building is identified in section 3.3.2. The steps required to complete the general work activities and steps to eliminate the specific concerns are listed in the Integrated Work Control Package (IWCP) for the area.

- Review of historical information and completion of sampling/surveys necessary to characterize the work areas. This characterization will identify/verify the potential hazards within an area so that the work packages can be developed to ensure the individuals assigned to work within an area are properly trained and protected The protection can consist of engineered controls, administrative controls and proper personnel protective equipment Further discussion of characterization is contained in section 4 0

Engineering walkdowns to determine how the decommissioning efforts will be completed Personnel involved as engineering team members in these walkdowns include

- Radiological Engineering.
- Radiological Operations
- Construction Management/Craft Forman
- Mechanical, Civil, Electrical and Instrumentation Engineering
- Waste Management
- Building Operations
- Industrial Health & Safety

Work plans will be developed by involving all the personnel (in the planning process) who will be participants in the decommissioning efforts. Further discussion of the engineering approach is contained is section 3 3 Engineering Approach

- Engineering package development - the information developed during the engineering walkdowns is combined with the applicable building documents/drawings to identify how the specific work tasks should be completed

- Continuing characterization consisting of radiation and industrial hazard surveys (i e asbestos identification) to be completed prior to and in parallel with the work activities to ensure the workers are properly protected in the changing work environment
- Excess equipment will be decontaminated, if cost effective, and removed from the area Equipment which is not decontaminated will be packaged in accordance with RFETS waste management procedures See section 7 0 for more detailed discussion of Waste Management
- Interconnecting system wiring, conduit and piping will be removed, decontaminated (as appropriate) and moved out of the area
- Building foundations, floors, walls, and ceilings will be decontaminated See Appendix 2 for more detailed discussion of decontamination techniques.
- Final contamination surveys will be completed to demonstrate the facility meets the applicable RFCA "End State Criteria"
- After all utilities have been disconnected and the building's internal structure is decontaminated the remaining structure will be dismantled to the foundation level, (foundation and all underground piping, conduit, wiring and utilities will be capped and left in place.)

3.2.1 GENERAL WORK SEQUENCE

This section identifies the general decommissioning steps which will be followed unless there are unique conditions which require more specific consideration and action Most of the decommissioning will be accomplished by following the general decommissioning steps identified below (See Appendix 2 for a more detailed description of decontamination methods)

This is the general sequence of decommissioning activities which will be completed in each work area If a unique situation exists within the work area which requires special decommissioning consideration a statement of how the problem will be approached is included after the work area description in Section 3 2 2. The details of decommissioning activities within an area of the building/cluster are included in the Integrated Work Control Package (IWCP) developed for that area/room

- Additional samples and surveys for beryllium, asbestos and radioactive contamination will be completed to verify the potential hazards within the work area are known This is a continuing process throughout the decommissioning project to ensure workers can be properly informed of the hazards and protected from the potential hazardous conditions
- Asbestos, if present, will be abated by a licensed contractor Other activities can not be completed at the same time in these areas, so this activity will be carefully coordinated to minimize interference with other activities.
- Painted surfaces will be checked to see if they contain lead This is necessary to determine the type of removal processes which should be used and the type of personnel protective clothing required
- External surfaces of equipment, piping, ducts, conduits, support members and other horizontal surfaces which are accessible will be wiped down (cleaned) to remove dust, dirt

and potential contamination This is a continuing house cleaning process which will be worked before during and after other activities The benefit is to prevent and minimize the spread of hazardous or radioactive contamination

- Electrical power supplies will be de-energized, disconnected and locked out to the maximum extent possible Conduit which contains wiring which could not be de-energized will be clearly identified Temporary power may be utilized and it will also be clearly identified and controlled
- Piping systems will be drained, isolated and locked out/tagged out prior to any work on the system
- The work areas will be stripped out of equipment and interconnecting system piping, conduit, bracing and supports as necessary to remove contaminated/potentially contaminated items and to remove items which could interfere with decontaminating the building/room surfaces or the final surveys. As a general flow path the equipment will be removed from the floor level and then from the overhead The room ventilation will generally be the last system to be removed unless a temporary ventilation system is set up for the work area.
- As equipment, components, items are removed they will be surveyed and packaged appropriately. Section 7 0 describes the waste management controls
- After the areas have been stripped to expose internal room surfaces the buildings internal surfaces will be decontaminated as necessary The surfaces will be sampled/surveyed to determine what areas need further decontamination and to verify the effectiveness of the decontamination process The decontamination effort continues until acceptable release levels have been obtained In general structural tear down will occur as a top-down process (i e , ceiling, walls, floor)
- Appendix 2 identifies several of the decontamination processes which are proposed to be used in this project Depending on the effectiveness of the chosen process another decontamination method may be required Funding may also be obtained for new technology development/demonstration For these reasons the project may use decontamination technologies not in Appendix 2 The general approach to the decontamination effort is further detailed in the engineering section, 3 4
- After the internal surfaces have been demonstrated to be within the End State Criteria the building(s) will be dismantled The building(s) foundation and all below foundation level piping, conduit, wiring, utilities, and structures will be left in place

Upon completion of this project the Building 779 cluster area will be transferred to the Environmental Restoration Department for further remediation to meet the final End State Criteria required by RFCA

3.2.2 WORK AREA DESCRIPTIONS

This section identifies the current conditions within the Building 779 cluster Following each description is a statement actions/considerations which are taken in addition to the general decommissioning steps previously identified

3.2.2.1 B779, Room 123

Room 123 is a decontamination room and likely has contamination in the process drains leading from the room

Room 123 will be emptied of any miscellaneous equipment and systems The room surfaces will be decontaminated using one of the dry processes described in Appendix 2, (i e , scabbling). The process drain will be surveyed and removed if found to be contaminated

3.2.2.2. B779, Room 124

This room was a Radiation Control Technician RCT office Radiation sources were stored in lockers in the center of the room.

Radioactive sources, furniture, and all system ducts and piping will be removed The room surfaces will be surveyed and sampled to check for contamination contained within the painted surfaces The room surfaces will be decontaminated as necessary.

3.2.2.3 B779, Room 125

This room was a Radiation Control Technician (RCT) office. This room had radiation sources stored in the NE corner

Radioactive sources, furniture, and all system ducts and piping will be removed. The room surfaces will be surveyed and sampled to check for contamination contained within the painted surfaces The room surfaces will be decontaminated as necessary.

3.2.2.4 B779, Room 126

Room 126 is a utility area. Initial surveys indicate there are no appreciable amounts of plutonium in this area. The room has gloveboxes for house vacuum and batteries for uninterrupted emergency power supply (UPS). Reportedly the gloveboxes are clean or have low levels of contamination The UPS is not operational The room 126 helium tank system and scrubber on the west wall was for a helium inert glovebox in room 133 The helium inert system was abandoned in the late 70's or early 80's The system was never put into services The room has an abandoned water sill for producing distilled water from the potable water system The cooling water from the system drained into tank 5 (T-5) The sill is not expected to be radioactively contaminated.

The sub-basement below Room 126 contains process piping for T-5 (i.e. , holding tank for all building 779 process drains including all lab sinks) This was a RCRA tank but it has been flushed and triple rinsed as well as closed from being a RCRA storage area Now T-5 receives sanitary and eyewash liquids T-5 can also receive low level radioactive solutions The liquid in T-5 is water from chillers, condensate water, and water from eye wash and safety showers The room above T-5 houses pumps and two cooling water system tanks. There are two other pits in addition to the one containing T-5 that are accessed from the pump room These pits are labeled as contaminated There are asbestos-lined pipes, (condensate steam lines) in the pump room overhead Two old concrete pump bases exist (pumps have been removed) and have been painted over It is possible that there is contamination underneath the paint

The UPS batteries in Room 126 contain sulfuric acid and lead The batteries will be sampled and handled appropriately. The tank (T-5) and other equipment in the basement sumps present a special problem in that the pits are confined spaces and the pits are contaminated. Entry requirements for confined spaces are detailed in the health and safety plan

The IWCP for this part of the work will have detailed instructions on how to protect the workers while they are completing activities in this room

3.2.2.5. B779, Room 127

Room 127 is a utility room containing chillers and part of the filter plenum. The filter plenum is contaminated and there is asbestos in the room The chillers are considered uncontaminated due to their location in the ventilation system.

The filters have fine dust (contamination) on their surfaces which present a special consideration Therefore, the filters ~~will be~~ replaced (removed) by specially trained individuals The filters will be finally removed from service as one of the last activities within this part of the building

3.2.2.6 B779, Room 128

Room 128 was used for repair of radiation instrument. Radiation sources were stored in this room

Routine decommissioning sampling/surveys and decontamination practices will be followed in this room

3.2.2.7 B779, Room 131

Room 131 was an aqueous lab supporting pyrochemical technology

Within Room 131 glovebox 961 (GB-961) was brought on-line in the mid-80's GB-961 was used to high fire (calcine) plutonium oxide The box is lined with lead which has been epoxied on The windows are etched from the chemical exposures Two furnaces are in this line The exhaust filter is dusty and needs changing GB-961 has an airlock with a vacuum line, filter and an uncertified hoist inside

Gloveboxes 131-A through E (GB-1B1C is a B-box) form an aqueous line. Various aqueous processing was performed ranging from cleaning tantalum stir rods with HCL to ion exchange. The boxes are lined with lead which has been epoxied on. The A - boxes are connected to a vacuum pump which is suspected to have internal contamination.

Windows on these boxes are scratched, dirty, and difficult to see in The general cleanliness of the aqueous line components is poor

The fume hood in the northeast corner of Room 131 was a general hood for storing volatile chemicals There is a fume scrubber system in the northeast corner next to the hood and a caustic scrubber on the northwest side of the hood The scrubber system is potentially contaminated

There are three wall storage cabinets on the south wall The storage cabinet contained oxidizers, low reactivity chemicals, non-flammable organics, inorganic bases, and other chemicals The lower cabinets contain additional chemicals and supplies

The room 131 gloveboxes and B - box will be decontaminated by wiping down the internal surfaces and then applying a strippable paint coat which is then removed The strippable paint is used to fix the loose contamination and acts to draw the contamination into its surface and away from the metal. When the strippable paint is pulled away from the coated surface the loose contamination is also removed Other equivalent techniques may be used Some of these are identified in Appendix 2. The room structures which remain after the equipment and gloveboxes are removed will be sampled/surveyed and decontaminated, as necessary, using a scarification/scabbling type process

3.2.2.8 B779, Room 132

Room 132 housed an auger spectrometer which is no longer there Room 132 is now being used as a calibration room/office. Sources were stored in a cabinet on the south wall, but have now been removed

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.9 B779, Room 133

Room 133 was a lab for research and development of (R & D) pyrochemical processes A number of small and medium scale furnaces were used for these operations, including Direct Oxide Reduction (DOR), Electrorefining (ER), Vacuum Melting, Molten Salt Extraction (MSE), and salt scrub

The following gloveboxes are in Room 133

Glovebox 953 was designed for a can-counter, but was never used It is lined with lead which has been epoxied on The glovebox is believed to be only lightly contaminated There is a covered well in the bottom of the box

Glovebox 954 is lead-lined with the lead bolted on The box has an airlock on the south side which is empty There are two filters in the box to filter recirculating nitrogen One of the filters is slightly cocked, and is not sealed The six position storage rack in the glovebox is empty

The box shows some signs of corrosion and equipment within the glovebox are also corroded The floor appears dented corroded and has some debris

Glovebox 995 is lead-lined with the lead bolted on There is a vacuum melt furnace on the north end with a well below this section which is surrounded by its own box The bottom is filled with sand, corrosion, and signs of former spills There are what appears to be nuts and bolts on the bottom The furnace itself has a domed cap There is a criticality drain in the bottom of the vacuum melt furnace The glovebox contains a can of MgO sand, into which what appears to be nuts and bolts put into the oxide There is a can sealer in the south end of the box The glovebox has an emergency booster exhaust whose filter holder which is corroded Two wing nuts are not screwed on tight and the filter does not appear to be seated, (this exhaust line is currently closed). There is a hoist in the glovebox at the south end. The hoist is on a rail in the glovebox which runs along the length of the box. This glovebox was used in the late 70's and 80's to remove americium

Glovebox 956 has two story stationary furnaces with wells on the south and north end of the glovebox The box is lead-lined with the lead shielding screwed on In the middle of the box is an old furnace well underneath the box with a flat plate welded into the floor The glovebox potentially is contaminated inside The one exhaust filter is dusty There are miscellaneous tools in the box, some corrosion, and the floor is dusty and dirty There is a vacuum system at the north end under the box whose line has been welded shut at the bottom of the box

Glovebox 957 has a six position empty storage rack The glovebox has two exhaust lines, one with a filter, one without a filter The line with out the filter is partially open The airlock on the northwest corner is empty There is a muffle furnace on the northeast end which is closed to inspection Bag -in-bag has corrosion particles on top of the bag and there are corrosion materials on the floor of the box The vacuum pump hose from the vacuum system to the glovebox is deteriorating There is a filter housing outside and under the glovebox on the northeast corner Glovebox 958 has a vacuum cleaner inside the glovebox Glovebox 958 went into service in 1985

Glovebox 959 is lined with lead which has been epoxied on and it has two furnace wells There is an empty storage rack at the south end which can hold ten containers The rack has three lower storage positions and four upper storage positions The racks are water filled This water-walled storage rack was commissioned in 1985 The exhaust line in the center of the box has no filter (not designed for one) The exhaust line filter on the northeast end is in place and seems alright The box contains miscellaneous crucibles, tantalum, and ceramics The glovebox is dirty and contaminated

There are four control panels on the west wall which may be internally contaminated

On the south wall are three wall cabinets which did contain reactive metals including calcium, magnesium, zinc, tin, and aluminum The metals were stored in plastic bottles Ceramic crucibles were also stored in these cabinets The lower cabinet contains miscellaneous equipment and crucibles

Room 133 will be cleared of all miscellaneous cabinets to provide maximum access to the gloveboxes The gloveboxes will be cleaned, equipment removed and initially decontaminated The final decontamination and size reduction maybe done in place or after the glovebox is moved to another area

The room 131 gloveboxes and B - box will be decontaminated by wiping down the internal surfaces and then applying a strippable paint coat which is then removed The strippable paint is used to fix the loose contamination and acts to draw the contamination into its surface and away from the metal When the strippable paint is pulled away from the coated surface the loose contamination is also removed Other equivalent techniques may be used Some of these are identified in Appendix 2. The room structures which remain after the equipment and gloveboxes are removed will be sampled/surveyed and decontaminated, as necessary, using a scarification/scabbling type process

3.2.2.10 B779, Room 134

Room 134 contained three flammable chemical storage cabinets containing chemicals

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.11 B779, Room 135

Room 135 was used for storage by the RCT's.

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.12 B779, Room 137

Room 137 was an aqueous R & D laboratory Gloveboxes 106-1 through 106-6 formed an aqueous processing line along the east wall The aqueous processing included use of nitric acid and chloride processing Consequently some boxes are coated for corrosion resistance Glovebox 106-6 on the north wall was used for microwave denitration

Glovebox 106-1 has lead shielding that has been bolted in place The glovebox contains balances and an intake filter which is somewhat dirty The glovebox has an airlock that is clean and empty

Hood 106-1 is located in the Southwest corner of Room 137 The hood is contaminated HCl acid was stored in three one gallon glass bottles in the hood The sump pump for the process drain is contaminated (under the sink in the southwest corner of the room) Cabinets in the southwest corner contain chemicals, glassware, and supplies

Glovebox 106-2 has lead shielding that has been bolted in place There is a recessed ledge in the back of the box for the exhaust line which has some sort of buildup on the ledge

Hood 106-2 is located in the west-center of the room Several chemicals were used in this hood including phosphoric acid and non-flammable organics

Cabinets 4 & 5 contained chemicals, including reactive metals of aluminum, zinc, calcium, potassium, and cadmium as well as flammables

Cabinet 1 in the northeast corner of the room is thought to have contained organic acids

Glovebox 106-6 contains a furnace but unlike other gloveboxes it is not lead-lined. The glovebox is connected to the line through an airlock The exhaust filter is difficult to reach which could be a problem for filter changes Gloveboxes contain miscellaneous equipment, glassware, and the glovebox floor is dirty and exhibits corrosion. There is calcium chloride in the box. Cabinet number 3 is under this glovebox The cabinet contained bases (ammoniumhydroxide) and sodium silicate

Glovebox 106-5 has lead shielding that has been bolted in place. The house vacuum filter at glovebox 106-5 (Fulflo) is dirty. The coating on the glovebox floor is coming off.

Glovebox 106-4 has lead shielding that has been bolted in place. The box contained various chemicals and SNM including enriched uranium in nitric acid and enchant solution. The inside lining is completely corroded away The filter housing on top of the box has a plastic bag taped around it. There is house vacuum to the glovebox There is a recessed ledge in the back of the box going to the exhaust filter which is external to the box. There is some buildup on this ledge The floor of the box is dirty.

The B-box between 106-4 and 106-3 had no lead lining. The floor is clean. The exhaust filter is full of dust and needs changing Contamination is present within the B-box Glovebox 106-3 has lead shielding bolted in place. The lining inside the glovebox has corroded away The floor is dirty and corroded The exhaust line has a recess built into the box which has build-up on the floor of the recess.

The room 137 gloveboxes and B - box will be decontaminated by wiping down the internal surfaces and then applying a strippable paint coat which is then removed The strippable paint is used to fix the loose contamination and acts to draw the contamination into its surface and away from the metal. When the strippable paint is pulled away from the coated surface the loose contamination is also removed Other equivalent techniques may be used Some of these are identified in Appendix 2. The room structures which remain after the equipment and gloveboxes are removed will be sampled/surveyed and decontaminated, as necessary, using a scarification/scabbling type process.

3.2.2.13 B779, Room 138

Room 138 was used to store excess chemicals Routine surface contamination surveys indicate no loose contamination

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.14 B779, Room 139

Room 139 was a soil analysis lab. It has extremely low levels of contamination

Cabinet one contains equipment Cabinet two through eight contain chemicals The cabinet on the south wall next to the sink has contaminated soil samples on top of the cabinet The sump pump under the sink has been tripled rinsed.

Hood 139-S (SW) has a large magnet in the hood The hood is contaminated to low levels

There is a control panel in front of Hood 139-S which has contaminated equipment The west cabinet contained eight sources in small bottles.

The center table contained chemicals, tools, resins, and soil samples

No SNM was allowed in to B-Box 139-4 The exhaust line on the south end of the box has no filter The exhaust line connects in with a large filter housing overhead in the room B-box 139-4 contains absorbent columns and glassware. The box is contaminated

Box 139-3 has two round exhaust filters. There is an airlock on the outside of the north exhaust filter for inserting new filters. The box is connected to house vacuum. The box is fairly clean Although, there is a small amount of residue in the corners

No SNM was allowed in B-Box 139-2 B-Box 139-2 contains a furnace, tumbler, bottles, and pans B-Box 139-1 Was used with plutonium, americium, and depleted uranium

Although there is slight contamination is some areas, Room 139 does not seem to pose any unusual problems.

3.2.2.15 B779, Room 140

Room 140 was a sample preparation laboratory for metal analysis, weld failure analysis, etc There was some beryllium work performed in Room 140, however most was stainless steel work In the southwest corner of the room are two hoods (140SD and 140SE), which have some contamination. These hoods were used to prepare depleted uranium and beryllium samples. Surplus equipment is currently stored in the hoods which were used to prepare the depleted uranium samples.

The 140SE hood has beryllium and uranium contaminated.

The 140 SW hood was used for polishing Hood 140SW is also beryllium and uranium contaminated The hood is full of equipment and tools The exhaust plenum is connected at the back of the hood

Decontamination efforts in Room 140 will consider the potential beryllium hazards until surveys demonstrate the hazard is removed

3.2.2.16 B779, Room 140A

Room 140A was a support room for a scanning electron microscope (SEM) Room 140A houses a metallograph and miscellaneous supplies area

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.17 B779, Room 140B

Room 140B houses a scanning electron microscope (SEM) The SEM was used to analyze coated samples, such as saltcrete and cement The SEM is not believed to be contaminated

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.18 B779, Room 141

This room has an Electron Spectroscopy for Chemical Analysis (ESCA) which is used for non-radioactive analysis Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.19 B779, Room 141A

Room 141A has a microbe. The inside of the microbe chamber which is contaminated with plutonium. The microbe is non-functional. The filtered vacuum system for this unit is connected to the Health Physics vacuum system

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.20 B779, Room 141B

Room 141B has a scanning electron microscope (SEM) The SEM is not believed to be contaminated

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.21 B779, Room 141C

Room 141C contains a metallograph and optical reduction equipment This equipment was used to photograph samples and is not believed to be contaminated

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.22 B779, Room 142

Room 142 is a building utilities room. Room 142 was a RCRA storage unit for waste oil

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.23 B779, Room 171, 172

These two rooms were SNM storage vaults. A chainveyor vault is located in room 172 and room 171 has Benelex-shielded cubicles It is not known of any instances of prior contamination

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.24 B779, Room 217

Room 217 contains a contaminated auger and surface analysis ESCA. The ESCA was attached to a relatively new (late 1980's) stainless steel, non-lead-lined glovebox (Glovebox 330-371).

Glovebox 963 contains miscellaneous furnaces and balances Glovebox 963 is not lead-lined There is a shelf in the back which has dust on it. A vacuum pump is located under the glovebox which is likely to have internal contamination The glovebox is fairly clean with miscellaneous equipment inside the glovebox. There are stains on the back wall of the glovebox The stains appear as if something was leaking down from the top at one time

Glovebox 964 is a supporting non-lead-lined glovebox which was used to store SNM Glovebox 964 should be considered highly contaminated This glovebox was used for molten plutonium studies Two vacuum pumps are located under glovebox 964 and are likely to have internal contamination There is possible asbestos-containing materials in the glovebox There is a hydraulic pressure pump under the glovebox which may also be internally contaminated The glovebox also contains miscellaneous equipment

Glovebox 330-371 is unleaded The glovebox is fairly clean and contains miscellaneous tools and an auger which is internally contaminated This glovebox has glove-ports in its plexiglas windows The glovebox has an airlock which is empty Slight contamination is on the floor under the box

The E hood is fairly clean Fixed contamination exists on a grill outside of the hood It contains two small furnaces and miscellaneous equipment stored underneath the hood

A vault is located in the northwest corner of Room 217 The vault was used to store Uranium

The room 217 gloveboxes and B - box will be decontaminated by wiping down the internal surfaces and then applying a strippable paint coat which is then removed The strippable paint is used to fix the loose contamination and acts to draw the contamination into its surface and away from the metal When the strippable paint is pulled away from the coated surface the loose contamination is also removed. Other equivalent techniques may be used Some of these are identified in Appendix 2 The room structures which remain after the equipment and gloveboxes are removed will be sampled/surveyed and decontaminated, as necessary, using a scarification/scabbling type process

3.2.2.25 B779, Room 218

Hood 218SE is located on the southeast side of room 218 Hood 218SE is contaminated and houses a microbalance Hood 218SE is labeled out of service but has posted limits There is a vacuum pump under the hood which is likely to have internal contamination The hood is coated inside to minimize/prevent corrosion. The hood appears to have an old criticality drain, which is capped on the bottom and taped over on the top inside of the box The hood work surface is full of equipment The California hood 218SW was used for preparing polymer and cementation samples which were slightly contaminated The 218SW hood not lead-lined It contains balances, mixers, beakers, tools, and Portland cement

Glovebox 970 (GB-970) was used for plutonium storage and studies Glovebox 970 is highly contaminated. GB-970 was a very dirty (radioactively) glovebox which had, over time, considerable oxide on the floor. GB-970 has lead tape on the exterior front. GB-970 has a bagout port on the bottom of the box There is a vacuum pump underneath the glovebox which is disconnected but has internal contamination There is an empty three position storage rack, miscellaneous tools, and a balance inside the glovebox. The filter (inside the glovebox) has crystals growing on its surface. GB-970 has an airlock

Glovebox 971(GB-971) is not lead-lined GB-971 is slightly contaminated This glovebox was used for plutonium studies There are miscellaneous tools on the south side of the glovebox and also what appears to be a reaction vessel

In the northwest corner of room 218 sits a Gamma Cell which has a cobalt 60 source The cobalt 60 source was used for materials radiation studies

The colbalt-60 source is the most unique decommissioning challenge in Room 218 An attempt to clear the source from the area will be made The gloveboxes and hood will be decontaminated and size reduced as previously discussed

3.2.2.26 B779, Room 220

Hood 220SE is located on the southeast side of Room 220 Hood 220SE is contaminated Hood 220SE was used for material storage and entry to Glovebox 463 (GB - 463) Hood 220 SE is non-lead-lined The hood floor is relatively clean but, shelving is somewhat dirty GB-463 exhaust is to an external filter overhead in the southwest corner of Room 220

Glovebox 463 is non-lead-lined It was used for plutonium oxidation and waste disposal (ie all samples were burned here). The box contains a muffle furnace, tools, cans, check weights and a four position heat detector.

Glovebox 462 (GB - 462) has lead-lining which is bolted on GB - 462 has a vacuum system The glovebox was used for uranium/plutonium studies. GB - 462 is tagged "Out of Service" GB - 462 contains a small muffle furnace and hot plate. The glovebox has an airlock

California Hood 220C is non-lead-lined. It is posted with contamination levels. The hood has a vacuum system, and is cluttered with miscellaneous items.

Glovebox 974 (GB - 974) is lead-lined with the lead epoxied on. GB-974 was used for plutonium studies. GB - 974 contains a 3 position heat detector and is cluttered with miscellaneous equipment and tools The intake filter is not clamped down. There is a vacuum system connected to the glovebox which is contaminated The glovebox has an airlock Several cabinets on the south end of the room contain glassware and supplies.

Room 220 does not contain any unusual decommissioning challenges The gloveboxes will be decontaminated by wiping them down and through the use of strippable paint.

3.2.2.27 B779, Rooms 221A, 277, 275, 274

Rooms 221A, 227, 275 and 274 were used as office and study areas The rooms contain miscellaneous furniture and equipment.

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.28 B779, Room 221B

Room 221B was used as a storage area

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.29 B779, Room 222

Room 222 contains several gloveboxes and analytical hoods as identified below

Glovebox 975 (GB - 975) was used for plutonium studies This glovebox is divided in the middle and contains gloveports in the plexiglas windows GB-975 is non-lead-lined GB-975 contains balances, check weights, cans, and tools The south end of the floor beneath the glovebox is contaminated around the vacuum pump and there is fixed contamination on the outside of the glovebox window There is a vacuum system (disconnected) under the glovebox airlock The vacuum chamber is contaminated internally

Glovebox 976 (GB - 976) was probably used to complete some R &D studies on reactive species Glovebox 976 contains a 3 position heat detector, a vacuum furnace, balance, and miscellaneous tools There is a vacuum line from the airlock with no filter There are in-line sealed filters to and from the adjacent argon supply cabinet. A vacuum pump and chiller are servicing this glovebox

Glovebox 977 (GB - 977) is lead-lined with the lead epoxied on The box is not contaminated and is out of service There are no gloves on the box The glovebox is coated inside and there is an empty 3 position heat detector storage unit.

Glovebox 330-371 is a two part glovebox One part was used for sample preparation and contains an analytical balance The other side has a solution calorimeter These were for research and both boxes are contaminated The glovebox well on the west end is almost full with the calorimeter The glovebox has an airlock Room 222 contains an x-ray refractometer which is not contaminated

B-box 981 was not used very much but the glovebox is contaminated There were problems with the airlock between gloveboxes 980 and 981 so the flow regulators were not functioning properly and the dump valve wouldn't function when opening the airlock door It is unclear if these problems were ever rectified The box is non-lead-lined.

Glovebox 980 (GB - 980) is a nitrogen inert glovebox with an automatic dump valve and flow through system There may have been some R & D studies on reactive species completed in the glovebox The glovebox contains an analytical microbalance, tools, glassware and check weights The glovebox is cluttered and the intake filter is dirty The box has an airlock which is empty

Glovebox 982 (GB - 982) is non-lead-lined The box contains a muffle furnace, miscellaneous tools, and there are items in the airlock Beneath the box is an air sample bottle connected to piping entering the box The glovebox floor has residue on it and the intake filter is dirty

B-box 105 is contaminated and was used as an entry for gloveboxes 105 and 106

Glovebox 105 (GB - 105) was used for plutonium studies. The glovebox is lead-lined with the lead bolted on and lead taped The glovebox contains a one-position heat detector The coating inside the box is gone from the floor The glovebox floor is corroded and dirty The walls are still coated, but very dirty There is a muffle furnace in the glovebox and the glovebox intake filter is dirty There appears to be a sheet of transit (asbestos) on the southeast glovebox floor

Glovebox 106 (GB - 106) is contaminated and was used for storage of SNM and equipment The box is non-lead-lined The glovebox rear shelf is dirty

Hood 222NC was used for miscellaneous uranium and non-plutonium studies, primarily uranium studies Some of these R & D studies may have involved reactive species It was utilized as a non-contaminated box Experiments were conducted with encapsulated materials There is some contamination inside the hood There are also some glass, and supplies underneath the hood

Glovebox A60 was designed for gas and solid reactions It became inadvertently contaminated when contaminated tools were introduced Contamination levels should be very low The box is lead-lined with the lead bolted on The glovebox contains miscellaneous tools and is relatively clean An airlock is attached There is a vacuum pump under the box which is likely to have internal contamination

Glovebox (GB - 983) is uncontaminated according to a sign attached on the airlock. It was used for compatibility studies and was never contaminated. The glovebox is non-lead-lined This glovebox has gloveports in plexiglas window. There is some visible dust on the exhaust filter Glovebox 03339 is not contaminated and was never put into service. The glovebox was to be used for a calorimeter but was never used due to loss of funding It is lead-lined with the lead epoxied on

Glovebox 017 is contaminated It's use is unknown

Glove box 985 (GB - 985) was used in support of plutonium compatibility studies and is similar to Glovebox 975 The glovebox is not lead-lined GB - 985 contains a 3 position storage unit, a sample vial rack, a balance, laboratory press, and miscellaneous tools At the east end of the glovebox there appears to be a capped off exhaust line and filter housing Both inlet and exhaust filters are external to the glovebox in separate housings

Glovebox 986 (GB - 986) is without gloves GB-986 has moderate to very low uranium contamination The glovebox internal surface is coated with a protective material

Hood 555 is attached to a "Cary" Ultra Violet Mass Spectrometer It is slightly contaminated and has not been used since 1969

Glovebox 230 (GB - 230) is blanked off but contaminated The bolts are silicone sealed The box is lead-lined and the lead is bolted on There appears to be no exhaust to the lien (closed off) The line contains a pig tailed bag of trash in the south end The floor appears to have been swept There is a pile of tools in the center of the glovebox

Glovebox 989 and 990 are the same glovebox The box is non-lead-lined The glovebox contains two tube furnaces The intake filter is dirty There is a capped vacuum line on the south end of the glovebox and there is an empty airlock. The glovebox vacuum pump is under the glovebox and is likely to have internal contamination

Glovebox 992 (GB -992) is non-lead-lined There is a large lab press, polishing equipment and balance in the glovebox An enerpac hydraulic pump is underneath the glovebox which services the press The hydraulic system is likely to be contaminated internally There is a metal plate under the press (not welded to the glovebox floor) which has been silicone sealed along the edge The glovebox has an empty airlock

Glovebox 991 (GB - 991) is non-lead-lined The glovebox contains miscellaneous tools, check weights, and a balance The glovebox floor is clean However, the floor under the glovebox is contaminated on the north end

3.2.2.30 B779, Room 223

Hood 223-1 was used for beryllium work The floor in front of the hood is contaminated and there is probable contamination in the exhaust line from the hood. The hood is dirty inside and contains cans and beakers.
There is fixed contamination on the sink top next to the hood.

In the northwest corner there is a heater attached to a vent Lead tape covers the holes in the south side of the heater cabinet There is fixed contamination on the front of the filters leading into the cabinet

A vacuum coating surface is in the south center of Room 223 The inside of the furnace is open to the room through an open side port The furnace exhausts directly to the room

Contamination has been identified in the lab on the north wall There are large vacuum systems on the east wall that may be internally contaminated.

Although beryllium has been identified as being used in this room, the entire 779 building is being fully characterized for this hazard

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.31 B779, Room 225

Although there are no gloveboxes or hoods in Room 225 there is contamination on the northeast cabinet and a hot spot on the floor next to the vacuum system

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room.

3.2.2.32 B779, Room 228

This room was used for sample preparation for x-ray analyses, plutonium metallurgy and tensile testing

5.0 BUILDING CLEANUP CRITERIA

5.1 Radiological

In accordance with the requirements of the Rocky Flats Cleanup Agreement(RFCA) Residual Contamination levels present in Building 779 surfaces, equipment and demolition materials will be reduced to a level that will not cause the maximally exposed member of the public to receive, through all potential pathways, an effective dose equivalent (EDE) of 15 mrem above background in any single year The RFETS Building Radiation Cleanup Standard(BRCS) will delineate the specific levels of residual radioactive materials contained in remaining building surfaces, equipment and demolition debris that is complaint with the 15 mrem limit and appropriate ALARA considerations The BRCS is currently being developed in coordination with the EPA, CDEH, and DOE. The specific surface contamination levels for removable and total activity will be determined using an appropriate dose model such a RESRAD or RESRAD-Build. Data collected during characterization and the Final Decommissioning Survey will be input into an approved dose model to demonstrate compliance The Final Decommissioning Survey will be conducted prior to the demolition of the outer building structure The survey techniques and methodologies described in NUREG 5849, Draft NUREG-1505, and Draft NUREG-1506 will be used to develop and implement the Final Decommissioning Survey Until such time as the Building Radiation Cleanup Standard is approved, the criteria contained in DOE Order 5400 5 and associated RFETS radiation protection procedures will be used to determine if building surfaces, equipment and demolition debris is acceptable for unconditional release

5.2 Equipment Unconditional Radiological Release Criteria

The unrestricted release of equipment removed from site will comply with DOE Order 5400 5, RFETS Radiological Control Manual and associated RFETS radiation protection implementing procedures When 10 CFR Part 834 is approved the practices and procedures for the release of property and waste materials will be appropriately modified to ensure compliance

5.3 Beryllium Release Criteria

The release criteria and survey methods will conform with the approved RFETS policies and procedures Building surfaces and equipment suspected as being contaminated with beryllium will be surveyed to assess the level of any residual contamination The surface contamination action level for beryllium is 25 micrograms (ug) per cubic ft

5.4 Asbestos Containing Materials Cleanup Standards

Prior to and during the course of the decommissioning project a comprehensive assessment and abatement program will be implemented in accordance with the OSHA Standard 1926,1101, EPA 40 CFR Part 763 and the site specific Heath and Safety Practices Manual Characterization, sampling/survey, abatement will be performed by qualified personnel per the requirements of OSHA and EPA and NOSH The clearance standard or maximum allowable asbestos level(MAAL) for areas in with abatement was performed is as follows

- 0 01 f/cm2 utilizing the phase contrast microscope means of analytical technique 70 s/mm utilizing the transmission electron microscopy technique

Section 6 Authorization Basis

An Authorization Basis is the document recognized by the DOE as the contractual vehicle used to manager the risk of operating a nuclear facility and any of its immediate support buildings. This grouping of buildings is typically called a cluster and for Building 779 is hereafter simply refereed to as Building 779.

Under the Authorization Basis established by the Price-Anderson Amendments Act a DOE nuclear facility and its support buildings must have the risk of operating the facility analyzed and any controls established to limit the risk, either engineering or administrative, must be incorporated into formalized risk management documents. These documents are described as the Authorization Basis for operation of the facility and include an auditable safety analysis such as a Safety Analysis Report (SAR), a Basis for Interim Operation (BIO), or a Basis for Operation (BFO). These documents include the information gathered in the evaluation of the facility, the safety analysis performed, and the controls that were developed to control the risks. Submittal and approval of these documents constitutes a contract between the contractors and DOE to operate a facility in accordance with the controls established in the Authorization Basis.

The format of a SAR includes specific sections including the regulations controlling the facility, the hazards assessment, the accident analysis, and the development of the required controls including administrative controls.

The Building 779 (and its cluster) SAR is part of a total site wide risk analysis documentation that includes: The Site Safety Analysis Report (Site SAR), the Site Emergency Response Plan, and the Site Environmental Impact Statement.

6.1 Authorization Basis Transition

Decommissioning activities are covered in the Rocky Flats Cleanup Agreement and will be controlled by the appropriate Decommissioning documentation. Established controls have been reviewed and the necessary controls have been reformatted as appropriate for a CERCLA document.

The Decommissioning program, developed under CERCLA regulations, includes those nuclear safety controls necessary to protect the health and safety of the public, workers, and the environment. These controls are discussed below. Transition from the existing Authorization Basis documents to the new RFCA documents will be accomplished as the appropriate documentation is approved and under the control of the Decommissioning project manager.

6.2 Building 779 Operational Safety Requirements (OSRs) Reevaluated

The Authorization Basis for Building 779 and the other facilities included in the 779 cluster is currently an approved Safety Analysis Report developed in 1987, with no update since then. It was based on the conditions existing in the building during weapons production. This SAR was produced under Albuquerque Field Office guidance and interpretation of DOE Order 5480.5. The building also has a set of approved Operational Safety Requirements (OSRs) from June 1987. In addition there are currently six Unreviewed Safety Questions (USQs) that are applicable to the building, these are all listed below.

Document	Status	Conditions	Comments
SAR	Approved 1987	weapons production operations	Outdated, needs replaced
OSRs	Approved 1987	weapons production operations	Outdated, needs replaced
USQD-RFP-93.1170-TLF	4/93	Pu storage HSP 31.11 non-compliance	These will be closed out by the Decommissioning project.
USQD-RFP-93 1503-GLS	3/95	Raschig Ring non-compliance	
USQD-RFP-94.0615-ARS	3/94	HEPA filter testing non-compliance	
USQD-RFP-94 1186-BWW	3/95 revised 2/96	DOE Pu ES&H vulnerability study	
USQD-779-96 0274-ARS	2/96	Pu holdup on GB1363 filter	
USQD-RFP-96.0741-GLW	6/96	Transport and handling SNM containing hither than normal americium	

These building authorization basis documents have not been updated since the site mission has changed or to reflect deactivation and in view of the current intent to decommission this building the authorization basis needs to be revised. In keeping with the present objectives of the site, which is D&D, and the approved Rocky Flats Cleanup Agreement (RFCA) the changes needed for the building's authorization basis are being included in the appropriate D&D documentation.

A D&D Health and Safety Plan has been developed and addresses worker risk and the results of an auditable safety analysis This supplies the authorization basis documentation for a radiological facility as recommended in DOE-EM-STD-5502-94 This standard, while not having the legal stature to be considered as an ARAR, is being used for guidance on recommended hazard baseline documentation for nuclear facilities The additional authorization basis controls identified in the auditable safety analysis will be developed and be included in the Building's Decommissioning Operating Plan (DOP) or project plans This process provides an appropriate integration of the needed nuclear safety controls into the RFCA single regulatory organization management agreement.

The auditable safety analysis will be performed based on building's current deactivated conditions and the proposed D&D activities This auditable safety analysis will be performed in compliance with the CERCLA risk assessment guidance taking due consideration of the Rocky Flats Environmental Technology Site (RFETS) nuclear safety analysis procedures which implement the requirements of DOE Order 5480 23, Safety Analysis Report and DOE Order 5480 22, Technical Safety Requirements This auditable safety analysis will be based on the acceptance criteria of less than $1X10^{-6}$ additional cancer risks from all involved radiation sources, both external and internal sources

A cross reference from the existing Building 779 SAR/OSR requirements to the DOP requirements will be provided in Appendix 4 Appendix 4 will also discuss the criteria requiring the nuclear safety controls included in the DOP or project plans, so that when a criteria requiring a nuclear safety control no longer exists the control can be discontinued Documentation for discontinuing one of these nuclear safety controls will be a letter sent to the DOE Administrative Record File and the appropriate Nuclear Safety Organizations

Appendix 4A - Building Characterization

Nuclear Safety Control	Nuclear Safety Requirement	DOP Requirement	Downgrading Criteria
Category 2 facility	SAR or applicable other authorization basis and H&SP	DOP and H&SP including Bldg 779 D&D Auditable Safety Analysis concerns	Pu Inventory less than 900 or 450 (if criticality is precluded) grams
Category 3 facility	SAR or applicable other authorization basis and H&SP	DOP and H&SP including Bldg 779 D&D Auditable Safety Analysis concerns	Pu Inventory less than 8 4 grams
Radiological facility	H&SP	DOP and H&SP including Bldg 779 D&D Auditable Safety Analysis concerns	Contamination levels less than 40 CFR 302 Table 302 4 plus Appendix B
Industrial facility	H&SP	H&SP	Demolition

Appendix 4B - Building Controls

Nuclear Safety Control	Nuclear Safety Requirement	DOP Requirement	Downgrading Criteria
7 3, 7 3 1, 7 3 2	Confinement System	The primary confinement function must be maintained when radioactive material including surface contamination) is present. One stage of each installed Zone II exhaust system HEPA filter shall be verified to operate at 99 9% efficiency	Removal of all loose surface contamination
7 3 4, 7 3 4 2, 7 3 4 3	Safety Monitoring, Detection, and Suppression Systems Criticality Alarm System, Fire Detection, Fire Suppression	Safety monitoring, detection, and suppression systems are the criticality alarm system, fire detection and fire suppression systems These systems shall be maintained operable in accordance with the appropriate consensus standards as described in the Decommissioning Health and Safety Plan	These systems and associated controls can be shutdown and removed when an analysis performed in accordance with the applicable standard shows the system is no longer needed. Documentation shall consist of a letter to the Administrative Record and the applicable site safety managers

Nuclear Safety Control	Nuclear Safety Requirement	DOP Requirement	Downgrading Criteria
7 4 7 4 1 7 4 2 7 4 4 7 4 4 2 7 4 4 3 7 4 4 4	Surveillance Requirements Primary Confinement System Secondary Confinement System Safety Monitoring, Detection, and Suppression Systems Criticality Alarm System Fire Detection Fire Suppression	Surveillance requirements apply to testing, calibration, monitoring, and/or inspection to ensure that necessary quality and operational status of systems and components are maintained Surveillance ensures that parameters and set points are periodically verified to be within acceptable limits Surveillance's shall be documented. These surveillance's are included in the Decommissioning Health and Safety Plan	Surveillance can be discontinued when the building has no loose radiological contamination remaining in it and no inventories of radiological materials greater than the levels found in 40 CFR 302 Table 302 4 plus Appendix B which is not containerized in approved DOT shipping containers
7 6 7 6 1 7 6 2 7 6 3 7 6 4 7 6 5	Administrative Controls Training Internal Review & Change Program Procedures Facility Management 7 6 5	Building 779 administrative controls are described in this Building 779 Decommissioning Operations Program (DOP) and will comply with the Rocky Flats Environmental Technology Site (RFETS) Decommissioning Program Plan (DPP) This is in agreement with the approved in the RFCA	These D&D administrative controls shall remain in effect until this D&D project is completed

7.0 DESCRIPTION OF METHODS USED FOR WORKER AND PUBLIC HEALTH AND SAFETY

7.1 Introduction

7.1.1 Scope

The purpose of this section of the DOP is to describe the health and safety controls and monitoring program to be utilized during the decommissioning of Building 779 and its support facilities. This program will be implemented by utilization of federal OSHA standards and site specific plans and procedures.

7.1.2 Policy

It is the policy of RMRS to ensure all employees are afforded a safe work environment while performing decommissioning activities on Building 779 and it's support facilities. Afforded with this opportunity is the assurances that RMRS will adhere to all federal, state, local and city regulations and ordinances as applicable, to assure worker safety and safety to the public is maintained at the highest level possible.

7.1.3 Objectives

The major objectives of the Health and Safety controls and monitoring for the Building 779 Cluster Decommissioning Project are:

- Protect the decommissioning employees, surrounding workers, the public and environment from potential and real hazards during the decommissioning process.
- Ensure total safety management and quality is administered throughout the decommissioning process.
- Develop and maintain a high level of health and safety awareness that is practiced by all levels of management, supervision and employees
- Establish a goal of zero lost time accidents for the entire decommissioning process of Building 779 and support facilities.
- Foster excellent safety communications between all site work groups that are affected by the decommissioning of Building 779 and its support facilities to ensure the intent and goals of RFCA are met

7.1.4 Technical Resources and Approach

RMRS will utilize the site specific Health and Safety Practices manual as the upper tier document to govern health and safety of the workers utilized during the decommissioning process A building-specific safety plan will supplement the site Health and Safety Practices Manual to focus on the specific safety concerns (chemical, radiological, industrial and hazardous) in Building 779 and it's support facilities which exist or created during the decommissioning process

As other safety documents are developed for new or changing environments, during the decommissioning process, they will be incorporated into the appropriate plans and/or work instructions.

Additionally the appropriate OSHA standards (1910 and 1926) will be utilized and referenced as necessary to safely conduct decommissioning work activities in building 779 and it's support facilities.

7.1.5 Job Safety Analysis

As discussed in section 4 0 (Characterization) several types of hazards have been identified in building 779 and it's support facilities that will be evaluated to ensure the appropriate controls will be included in the work instruction. These hazards include

- Plutonium
- Beryllium
- Uranium
- Lead
- Acids
- Radioactive
- Asbestos
- PCBs
- General Industry Hazards

Based on this knowledge, the work supervision and industrial hygiene support personnel will perform a Job Safety Analysis (JSA) for the work tasks which have the potential to injure or damage personnel, property or the environment This JSA (Job Safety Analysis) will identify things such as potential hazards, training requirements, protective control measures and special equipment needs for specific job steps The job safety analysis will be implemented utilizing the sire Health and Safety Practices manual, practice HSP 2 11

7.2 INDUSTRIAL SAFETY

7.2.1 Applications

Day to day industrial activities will be governed by OSHA standard 1926 (Occupational Safety and Health Standards for the Construction Industry), site Health and Safety Practices Manual and other RMRS and project-specific safety documents, as applicable The OSHA standard 1910 (Occupational Safety and Health Standards for General Industry) will be utilized when OSHA 1926 does not cover or address a specific health and safety topic

Areas to be addressed, and implemented by utilizing the site Health and Safety practices manual include, but are not limited to

- First Aid and Medical Attention
- Fire protection and prevention
- Housekeeping/Egress
- PPE
- Employee Emergency Action Plans
- Noise Exposure
- Foot Protection
- Hearing Protection
- Head Protection
- Eye and Face Protection
- Safety Belts, Lanyards, Safetynets and Lifelines
- Proper Tool and Machine Guarding
- Fall Protection
- Basic Electrical Safety
- Lockout and Tagout
- Scaffolding Usage
- Demolition
- Welding/Cutting Operations
- Ladder Safety
- Basic Respiratory Protection
- Confined Space Entry
- Excavation/Trenching
- Ergonomic Concerns
- Bloodborne Pathogens

Individuals will be trained for their specific job task (s). A project specific training matrix will be used to identify training requirements for project personnel, (reference the RMRS training plan, RMS - 004).

7.3 TOXIC/HAZARDOUS MATERIALS AND CHEMICAL SAFETY

7.3.1 Applications

Hazardous materials and chemical hazards will be governed by the applicable regulations and site specific Health and Safety Practices manual A job safety analysis (JSA) in accordance with HSP 2.11, will be completed before handling, storing, transferring or disposing of these items The JSA will identify job specific training requirements The RMRS training matrix is structured to ensure workers are trained according to their specific work task If workers are working with a specific hazard (i e., asbestos awareness), job specific training will be provided

Examples of other work tasks which would require training verification or additional training are:

- Asbestos abatement
- Lead movement and handling
- Beryllium protection and clean-up
- Toxic chemical control
- Plutonium movement and handling
- Toxic chemical handling and transfers
- PCB Management
- Hazardous materials storage and transfer

Additionally before handling any of these materials personnel will be trained in the use of the appropriate protective equipment, (PPE)

7.4 RADIOLOGICAL SAFETY

7.4.1 Applications

Radiological work activities are required to comply with 10 CFR 835 - Occupational Radiation Protection, The U.S. Department of Energy Radiological Controls Manual, The Rocky Flats Site Radiological Controls Manual (site RCM) and the Site Health and Safety Practices Manual Areas of focus in radiological safety include:

- Applications of ALARA practices and principles
- Radiological engineering work controls
- Construction and Restoration Projects
- Controlling the spread of contamination
- Decontamination techniques
- Ventilation usage and controls
- Radioactive material handling, storage and control
- External and internal exposure controls
- Respiratory protection usage
- Radiological worker training
- Radiological worker training for special applications
- Radiological performance indicator goals and standards
- Personnel contamination control

All personnel working in radiologically controlled work areas will be trained in the appropriate procedures for proper monitoring, correct work techniques and the proper usage of PPE while working in these areas It is understood that in some cases the hazardous material or chemical environment might be located in a radiologically controlled area If this occurs, the most prescriptive PPE for the most extreme hazard is to be utilized for protective purposes

7.5 PROGRAM ELEMENTS

7.5.1 Applications

In preparation for the decommissioning of Building 779 and it's support facilities, key elements of the Health and Safety Plan will be in place prior to starting the decommissioning efforts Some of the key elements (of the safety program) are

- General safety training for all workers involved in physical decommissioning work activities.
- Specific safety training for workers and supervisors depending on the job task and hazards involved.
- Supervisory safety task assignments criteria.
- The development of safety communication vehicles (i.e., safety toolbox meetings, bulletin board information, safety newsletter) etc
- Designations of competent persons
- Establish employee stop work authority process
- Establish process for all employees to correct safety and health hazards

7.6 EMERGENCY/INJURY MANAGEMENT

7.6.1 Applications

During the decommissioning process for Building 779 and it's support facilities, RMRS will utilize the site Health and Safety Practices manual for illness and injury reporting. The procedure HSP - 3.03 covers specific elements such as.

- Reporting requirements for injuries or illnesses of personnel.
- OSHA 200 form requirements.
- Classification of accidents.
- Reporting requirements for vehicle injuries/damage
- Reporting requirements for property damage
- Investigation requirements.
- Follow up actions for injuries/illnesses

If a radiological incident report is required in the event of an occupational injury in a radiologically controlled area, it will be processed in conjunction with the safety reporting forms utilizing HSP - 3.02, Radiological Deficiency Report

7.7 ENVIRONMENTAL MONITORING

7.7.1 Applications

- Procedures to be utilized for environmental monitoring include utilization of the Site Health and Safety Practices manual and the site Radiological Controls manual (site RCM) These procedures include, but are not limited to the following

- Radiological Controls Manual - Chapter 4 - Section 422, Release Requirements to Uncontrolled areas
- Site Health and Safety Practices Manual - Chapter 9 - Material Handling Storage
- Site Health and Safety Practices Manual - Chapter 3 - Industrial Hygiene.
- Site Health and Safety Practices Manual - Chapter 18 - Section 18 10 and section 18 23, Radioactive Material Transfer and Area Monitoring
- Site Health and Safety Practices Manual - Chapter 20 - Environmental Safety.
- Site Health and Safety Practices Manual - Chapter 21 - Material Disposal.
- Site Health and Safety Practices Manual - Chapter 30 - Fire Protection Policy, Programs, Organization.

Additionally, independent of decommissioning Building 779 and it's support facilities, the site air and water quality groups perform their normal monitoring requirements for the Rocky Flats Environmental Technology Center at time specified intervals Reference section 8 0 for a further discussion of environmental compliance

Glovebox 045 (GB - 45) contains an Instron testing machine GB-45 is non-lead-lined It contains a six position and a two position heat detector and miscellaneous tools The glovebox floor is dirty There is a glovebox well under the south end of the box

B-box 191 is non-lead-lined The B-box has low level internal contamination The B-Box contains two diamond cutoff saws and a vacuum bell jar A metal plate with lead tape covers a hole in the box floor The lead tape is around the plate edges and attaches to the glovebox floor The glovebox floor needs cleaning, particularly behind the exhaust sash. Glovebox 192 (GB - 192) is non-lead-lined GB-192 contains six tube furnaces and miscellaneous tools Four of the furnaces appear dated and could contain asbestos The glovebox has an airlock

Glovebox 192 (GB - 192) is non-lead-lined. GB-192 contains six tube furnaces and miscellaneous tools Four of the furnaces appear to be dated and could contain asbestos. The glovebox has an airlock

Glovebox 202 (GB - 202) is non-lead-lined. There is, however, lead tape around the windows. This glovebox contains a constant temperature bath on the east end with other miscellaneous items. The floor is relatively clean except behind the temperature bath where there appears to have been some kind of build up GB - 202 has an airlock which is empty

Hood 202 is non-lead lined The hood contains polishing and cutting machines The hooded floor is dirty The hood's exhaust line runs to a large overhead room filter plenum

Hood 468 S is non-lead lined Hood 468 S contains a sputtering coater in the west end which was used for coating plutonium samples There are miscellaneous cans and tools in the box The hooded area is dusty and the exhaust filter is dirty

Hood 468 NE is non-lead lined Hood 468 NE contains a canner, balance, miscellaneous cans and tools There is a disconnected vacuum pump under the hood which may be contaminated internally The intake filter is under the hooded floor in the northeast corner

Hood 468 NW is non-lead lined The box contains miscellaneous tools

Hood 198 is non-lead lined Hood 198 does not have an exhaust filter

Glovebox 199 (GB - 199) is lead lined which is epoxied on Glovebox 199 was used for plutonium sample polishing The glovebox contains a vacuum furnace, a diamond cut-off saw, a muffle furnace, balance, a five-position heat detector and an airlock The vacuum pump located under the glovebox is likely to have internal contamination There are two pass-throughs, one to Room 234 glovebox 205, and one to glovebox 203 Lead shielding under the box is sagging and coming off the glovebox

Glovebox 203 (GB - 203) is non-lead lined GB - 203 contains two polishing machines, an ultrasonic cleaner and miscellaneous tools There is a vacuum system under the box which could be internally contaminated The glovebox has a pass-through to room 234, glovebox 205C The exhaust filter is dirty

Glovebox 200 (GB -200) is non-lead lined The glovebox contains a tube furnace on the west end and a constant temperature bath On the east end there is miscellaneous tools throughout The airlock is on the east end The vacuum system for the tube furnace is under the glovebox and likely to be internally contaminated

Glovebox 201 (GB - 201) is non-lead lined GB -201 contains a microbalance which is attached to a rubber gasket in the floor to dampen vibration

There are five x-ray refractometers in Room 228 which are not believed to be contaminated Although there are several gloveboxes and hoods in this room the decommissioning efforts in Room 228 are not expected to have any special challenges. Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.33 B779, Room 233

Room 233 is an office containing a workbench, desk and bookshelves. This room is connected to Room 235

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room.

3.2.2.35 B779, Room 234

The room 234 gloveboxes (205A, B, C, D) were used for plutonium sample preparation as described below·

Glovebox 205 was used for sample preparation The glovebox contains a balance, assorted tools and check weights. There is a cover over the exhaust filter The frame that holds the window in the box has lead tape applied to it indicating a potential for a leaking window or the presence of contamination. Above the glovebox is a freon tank. The vent for this tank is located in the glovebox. A vacuum pump is located below the glovebox It is suspected that this pump was used to fill the freon tank above the box GB-205 has a pass-through that goes to the gloveboxes in Room 228 It appears that trash is present with the tools used to move items through the pass-through

Glovebox 205A contains a piece of Lexan, a heat detector and an ultra-sonic cleaner that may have used carbon tetrachloride. No carbon tetrachloride is present
Polishing of samples was performed in Gloveboxes 205B and 205C Both of these gloveboxes have floor mounted polishers The gloveboxes also contain tools, sample holders, ultra-sonic cleaners, heat detectors and empty bottles that at one time contained freon

Hood 205D was used for polishing and etching The glovebox contains tools, ultra-sonic cleaners, controls and empty bottles. GB-205 has a blanked off exhaust port with expanded metal welded over the opening. This represents a location that cannot be readily decontaminated and therefore may have significant contamination

Hood 205E is small in size and contained sample vial containers which are to be removed during deactivation

Room 234 also contains two metallographs Both are contaminated and have signs that indicate removable and fixed contamination is present The floor below the metallographs also has radioactive contamination

The room's refrigerator was used to store chemicals for photo developing and sample molding Room 234 has a fire cabinet which stored solvents and an acid cabinet which was used to store acids such as nitric and hydrofluoric acid.

A large yellow paint spot on the floor covers fixed contamination Room 234 contained several chemicals which may have left a residue This will be a particular concern when initial room cleaning is being completed. The chemicals and freon will be removed during deactivation The details of how to remove the chemical residues will be contained in the IWCP. The residues are to be wiped up and handled per the building WSRIC.

3.2.2.35 B779, Room 234A

Room 234A x-ray unit which has been removed from the room Room 234A is now used for storage and contains four empty drums and one empty overpack that was for a project that is no longer funded. The floor has several areas with yellow paint indicating the possibility of fixed contamination on the floor

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room.

3.2.2.36 B779, Room 234B

This room was used as a dark room There is no expected contamination in this room

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.37 B799, Room 235

Room 235 has a TEM (transmission electron microscope) It does not appear that the unit has been radioactively contaminated.

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room.

3.2.2.38 B779, Room 270

In the southeast corner of Room 270 is a ESCA used for surface analysis. Glovebox 2115 was not used and should not be contaminated Gloveboxes 972 and 973 were used for plutonium and hydrogen studies Two x -ray units were removed, from the northwest corner, placed in crates, and are being stored in Room 157 (these were partially contaminated) B-box 270 N is empty, but the B-box is contaminated with U - 235 Glovebox 3072 is contaminated and has some tools remaining inside the glovebox The glovebox also has U-235 contamination

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.39 B779, Room 271

Room 271 was used as a low level mixed (LLM) waste storage area

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.40 B779, Room 272

Room 272 was a testing laboratory The center glovebox 6620 is uncontaminated Glovebox 6621 (GB-6621) was used to support testing and is plutonium contaminated

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.41 B779, Room 273

Room 273 has fixed contamination on a box of electrical connectors. No other history is known

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.42 B779, Room 147

Room 147 was used for drum storage of non-RCRA drums and treatability study samples

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.43 B779, Room 150

Room 150 contains equipment used for welding and supercritical CO_2 cleaning The room equipment includes EB welders, tanks, work benches, storage cabinets, vices, tool boxes, fixtures, a fire cabinet, grinders, sanders and bookcases The room has one welder, marked "caution beryllium" and three hoods (150N, -S, and -W) connected to the building ventilation system It is thought that minimal radiation operations were performed in this room though the possibility exits for contamination

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.44 B779, Room 152

Glovebox 208 was deactivated in 1995 Glovebox 208 is lead lined and lead taped The glovebox contains a large vacuum furnace on the south end, which is open and empty. The critically drain on the south end of the box has been welded shut
Glovebox 211 has been deactivated. Glovebox 211 is lead lined and epoxied and lead taped The glovebox has an airlock which is empty

Glovebox 007 has been removed. There is an empty vault located in the north end of the room

There is contamination posting in the northwest corner of the room

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.45 B779, Room 153

Room 153 was used from drum storage and had one RCRA drum storage location was used to collect leaded gloves. This room also contains a trash compactor

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room.

3.3.2.47 B779, Room 153A

Room 153A appears to have been used for drum storage at one time. This room contains signs on the wall labeled "hot tooling" and "tritium". The room contains a trash compactor, a lead drum shield, and three abandoned pumps

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.47 B779, Room 153B

Room 153B is a down draft room. Room 153B is used to open contaminated/potentially contaminated enclosures and is used for repackaging drums.

Room 153B has significant contamination levels and poses a special problem in that it is the first down draft table which will be decommissioned Engineered controls will be included in the IWCP for disassembly of the pump-down table.

3.2.2.48 B779, Room 154

Room 154 was used for hydriding and hydriding of plutonium
Glovebox 1363 and 1364 is where hydriding/dehydriding was accomplished Glovebox 7248 (GB - 7248) is lead lined which is bolted on. Lead tape has also been used This glovebox contains three furnaces and there is corrosion on the bottom of the glovebox There is a vacuum pump underneath GB -1364 which has internal contamination The glovebox has airlock on the south end GB-1364 has a criticality drain on the south end which is taped over and plugged

Glovebox 1363 (GB - 1363) is lead lined which is bolted on. Lead tape has also been used GB -1363 contains two furnaces and has an airlock at the south end There are two internally contaminated vacuum pumps which were used to support GB - 1363 operations. The tray on the outside of this box is contaminated

Glovebox 2025 (GB - 2025) is non lead lined GB -2025 was used to burn off hydrogen from the hydriding process The glovebox contains a torch and some miscellaneous tools The glovebox cooling water supply valve located on top of the box (outside) is highly corroded and has been leaking GB - 2025 has an airlock

Glovebox 1365 (GB - 1365) has bolted on lead lining with lead tape. The glovebox is corroded inside and contains miscellaneous jugs and containers The vacuum pump has a line to the airlock located on the north end The criticality drain on GB - 365 is painted with magenta paint indicating fixed contamination

Glovebox 4933 (GB - 4933) has bolted on leading lining with lead tape over seams The glovebox has a three space heat detector and hot plate The glovebox internal surface is coated but the coating is coming off The entire glovebox's internal surfaces are dirty to the point where windows are difficult to see through

Decommissioning activities in Room 154 will be approached with extreme care as plutonium hydride is very unstable from a pyrophoric stand point All the SNM was removed by the SNM consolidation and deactivation groups No hydride is expected as the gloveboxes are no longer inerted but, precautions will be implemented to let the workers know what could be expected if hydride is found

3.2.2.49 B779, Room 155

Room 155 was a plutonium sample-mounting laboratory supporting auger spectroscopy Room 155 had etching equipment, polishing equipment, a furnace and B-boxes to pull samples out of the production line

Hood 155 NE was a 90 day accumulation area (779-2269) The hood was full of chemicals from top to bottom Hood 155 NE contains trash and corroded laboratory equipment Some of the chemicals have leaked out the back shelf There is possible transite (asbestos) lining the hood

Glovebox 206-218 is non-lead lined The glovebox box contains a muffle furnace, miscellaneous tools and a heat detector Glovebox 206-219 is non-lead lined The glovebox contains a polishing wheel, burnables, and cutting disks

Glovebox 206-220 is non-lead lined It contains two polishing wheels

Glovebox 206-221 is non-lead lined It contains two electroetching units This glovebox has significant contamination

Glovebox 206-222 is non-lead lined. It contains a cutoff saw, tools, balance, heat detector, and vacuum furnace

Glovebox 206-223 is non-lead lined. The glovebox contains a polishing lap, miscellaneous tools and bushings There are two vacuum pumps underneath glovebox 206-223, which access glovebox 222 The vacuum system is internally contaminated There is a criticality drain which has a cover over the bottom outlet.

Glovebox 206-224 is non-lead lined The glovebox contains a polishing lap and miscellaneous tools.

B-box 206-225 contains electropolishing equipment. There is direct contamination on the shelf in front of the B-box

Room 155 has indications of chemical residues in the B-boxes and gloveboxes The residues will be removed during the initial cleanup/wipe downs After the chemical residues have been removed. Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.50 B779, Room 156

Room 156 is a calorimeter room The calorimeter and two portable air handlers (which are contaminated) which remain in the room The air handlers have been wrapped in plastic and tape

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room.

3.2.2.51 B779, Room 157

Room 157 was used for various materials testing

Glovebox 223 (GB -233) houses a contaminated tensile testing machine. GB-223 is non-lead lined GB -223 contains miscellaneous tools, an old style heat detector and miscellaneous equipment.

Glovebox 224 was used to prepare samples and is contaminated

Glovebox 222 was never connected It contains a tensile machine and is considered uncontaminated

Glovebox 225 has its gloves missing and is uncontaminated

Glovebox 226 has gloves on the glove ports and although the glovebox is clean it does contain a few tools. The airlock ledge inside the glovebox has some dust. There are two filter housings located external to and above the glovebox

There are miscellaneous cabinets and electronic equipment in Room 157

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room.

3.2.2.52 B779, Room 159

Room 159 was a permitted storage area for RCRA waste (unit 779-90 42). The RCRA unit closed.

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room.

3.3.2.53 B779, Room 160

This room was retrofitted in the early 1980's as a pyrochemical development facility. Operations that took place in this room included DOR, ER, MSE, Salt scrub, and other high temperature studies with plutonium and americium

In 1985 there was a major stationary furnace breach in glovebox 865 which contaminated the entire room with plutonium and americium Smears taken immediately afterward from around the room measured extremely high. It took an entire year to completely decontaminate the room Walls, floors, ceiling, and pipes were painted after decontamination to fix any residual contamination remaining. There were reports of contamination migrating into the ventilation system and into other adjacent rooms through the ventilation system

Glovebox 865 has bolted lead lining. There are two stationary furnaces in this glovebox. the floor has tape and dust. There is a "high bay" area on top of the glovebox likely has significant contamination on all internal areas of the glovebox There is a vacuum pump located underneath the glovebox which is internally contaminated. The furnace on the west side is the one that failed and contaminated the room

Glovebox 867 is "cold," and never used. The door to the main line is blanked off This box is labeled as being out of service. It is lead lined which was epoxied on. There is debris on the floor of the box, probably from welding activities during installation. There are leaded glass windows over the plexiglas.

Glovebox 863 (GB - 863) is lead lined and epoxied on GB- 863 box has a chainveyor for moving materials between the boxes attached to it There are two stationary furnaces in this glovebox The glovebox has miscellaneous tools and a furnace lid in the south end The floor needs cleaning

Glovebox 866 (GB - 866) is lead lined and epoxied on This glovebox has two wells intended for calorimeter The glovebox is connected to glovebox 863 by a rubber blank which has not been cut The glovebox should be uncontaminated Note that the rubber gasket is bulged into the main line without support This box should be "cold" since it was never put into service

Glovebox 857 (GB - 857) is lead lined and epoxied on. GB -857 has an airlock The floor of GB -857 is corroding in places The glovebox does contain furnaces, tools, and hot plates GB - 857 is serviced by a vacuum pump which is likely to have internal contamination

Glovebox 862 is a continuation of glovebox 863 It is lead lined and epoxied on The connection between this box and glovebox 860 is contaminated outside the glovebox at the gasket separating the gloveboxes

Glovebox 860 (GB-860) is an SNM storage box It is water walled with lead epoxied on the front of the box GB-860 contains a 32 position storage rack

GB - 859 was the breakout for removing buttons and salts from crucibles GB-859 is lead lined and is epoxied on There is miscellaneous equipment in this glovebox which includes a drill press The glovebox floor is warped and may have fixed contamination imbedded in the stainless steel floor This glovebox also has an airlock on the west end which is out of service The airlock is clean

Glovebox 864 (GB-864) is lead lined and epoxied on GB-864 houses a large tilt-pour furnace which never went hot There is still a rubber blank (with metal backing) sealing GB - 864 from glovebox 862 There are no gloves on the gloveports of GB-864

Glovebox 858 (GB-858) is not lead lined GB-858 was to be a controlled atmosphere glovebox used for drying salts which were used in the pyrochemical operations Adjacent to GB-858 are two drying ovens for pre-drying the salts

Glovebox 872, 871 and 870 were we never put into service and will be moved for modification and reuse in Building 707

There are cabinets on the south wall which did contain cans of salts (NaCl and KCl), as well as unused ceramic crucibles The chemicals have been removed by the deactivation group

Glovebox 868 (GB-868) may be contaminated GB-868 is a conveyor line for transporting materials between glovebox 872 and 862

Room 160 also contains several control panels and other miscellaneous items Everything in Room 160 is potentially contaminated

Due to the accident in 1985 contamination may be deep within the floor walls and the ceiling of this room. Once the room is stripped of all internal equipment, ducts and interconnecting systems, a thin layer of the rooms surfaces will be removed to meet the End State Criteria Additional decontamination methods will be used as necessary

Decontamination efforts will continue until contamination is removed This process may lead to saw cutting and removing sections of the room See Appendix 2 for more details

3.2.2.54 B779, Room 160A

Room 160A was a vault that was full of SNM Room 160A is empty of all SNM.

Routine decommissioning sampling/surveys and decontamination practices (if required) will be followed in this room

3.2.2.55 B779, Room 163

Room 163 is currently being used for storage of empty drums

3.2.2.56 B779, Other Rooms

The other rooms within Building 779 are mainly office areas and shower facilities. These rooms have a low potential to have significant hazards/risk These areas will be fully characterized for risk before work is started

The general decommissioning steps will also be followed in these rooms.

3.2.3 Building 729

As described in Appendix 1 (section 1 2 4), Building 729 services the ventilation requirements of a portion of Building 779 Building 729 contains a control room, emergency diesel generator room and filter plenum room There is also a filter plenum duct bridge between Building 779 and Building 729.

Contamination within Building 729 would be in the 4 stage glovebox exhaust plenum system on the two stage building exhaust system

The plenum filters in Building 729 present a somewhat unique challenge in that the dust collected by these high efficiency particulate filters (HEPA) are very fine Special training will be given to individuals assigned to remove the filters

In general the sources within Building 779 will all be removed before the filter plenums in Building 729 are disabled Temporary ventilation will be provided, as necessary to supplement the Building 729 ventilation system during the decommissioning process. In addition the general decommissioning steps will be used in the Building 729 decommissioning process. No special activities are required in the remainder of Building 729 decommissioning

3.2.4 Building 782

As described in Appendix 1, (Section 1 2 8), Building 782 services the ventilation requirements of a portion of Building 779

The main features of Building 782 are it's three exhaust plenums, (Hood exhaust plenum, glovebox exhaust plenum and general building exhaust plenum), exhaust fans and fire water collection tank As with Building 729, the plenum filters in Building 782 are the most significant contamination risk The dust collected by the HEPA filters is very fine and could be easily spread Special training will be provided to the individuals assigned to remove the filters

The Building 779 ventilation sources will all be removed from service before the exhaust plenum filters in Building 782 are disabled Temporary ventilation will be provided, as necessary, to supplement the Building 782 ventilation system during the decommissioning process

In addition the general decommissioning steps will be used in the Building 782 decommissioning process No special activities are required in the remainder of Building 782 decommissioning

3.2.5 Building 727, Emergency Generator Facility

The Building 727 emergency diesel generator supplies backup electrical power to the Building 782 ventilation system to ensure continued operation of the exhaust fans Building 727 systems exhibit no unique hazards or risk The general decommissioning steps will be used in decommissioning Building 727 after the Building 782 exhaust system no longer requires back up emergency electrical power

3.2.6 The Following is a List of Other Building 779 Support Facilities

Building780	Paint/Storage Facility
Building780A	Metal Storage Facility
Building 780B	Gas Bottle Storage Facility
Building 783	Cooling Tower Pump House
Building 784	Cooling Tower
Building 785	Cooling Tower
Building 786	Cooling Tower West Chiller
Building 787	Cooling Tower East Chiller

These facilities do not exhibit unusual hazards or risk Therefore, the general decommissioning steps adequately cover decommissioning sequence for these facilities No contamination is expected to be found in any of these buildings

3.3 Engineering Approach

3.3.1 Objectives

The Engineering approach is based on achieving the following objectives

1.) Maximize worker safety while completing the decommissioning activities. In order to accomplish this objective the use of engineering controls is maximized where feasible Another important consideration is minimization of occupational exposure. The application of ALARA principals to each activity will be accomplished by having a dedicated Radiological Engineer as a part of the project team. One of the primary responsibilities of the Radiological Engineer will be ALARA job review

2.) Minimize the potential to release hazardous and/or radiological material to the environment The facility is expected to be fully decontaminated or have remaining contamination fixed in place prior to disrupting the primary building containment If the End State Criteria has not fully been satisfied additional engineering controls will be put in place prior to breaching the containment.

3.) Maintain project costs and schedule within projections. Costs are usually a function of adequate planning and risk projection. As discussed later, a project team will be used to plan the decommissioning efforts, thus minimizing unplanned activities. By using a team concept in the planning effort the potential risks will be better characterized. Schedule flexibility will be maintained by providing several options in planning the decommissioning tasks

4) Minimize radioactive waste generation The decontamination process selection plays an important part in minimizing secondary waste streams Scarification/scabbling is the primary decontamination method to be used on concrete surfaces Metal surfaces will be decontaminated using a variety of techniques The surfaces will be wiped down with cleaning solution, sprayed with strippable paint and potentially cleaned using abrasive blasting Other processes (such as girt blasting or microwave ablation) may be initialized if required and funded

5) Maximize the use of existing procedures and develop others as needed This will allow focusing project team members on the task at hand instead of creating new documents

3.3.2. Sequence·

The overall approach is to divide the highest risk (one which contains the most hazards) into workable sub-units. Planning and work documents will then be developed around the sub-units

The Building 779 Annex is the first sub-unit to be worked The annex was chosen as the first sub-unit because

1) The annex was built as a stand alone structure
2) The annex also has separate ventilation and utilities which can be decommissioned without affecting the remaining building systems or structures
3) Deactivation is complete

The second sub-unit consists of the Building 779 rooms, hoods and gloveboxes which exhaust through the ventilation plenums in Building 729 These areas were chosen because they contain a substantial amount of the remaining contamination hazards and the rooms and support systems can be isolated from the remaining building

The third sub-unit consists of the Building 779 rooms, hoods and gloveboxes which exhaust through the ventilation plenums in Building 782 These rooms and the exhaust plenum contain the remaining known contamination After the third sub-unit is decontaminated the Building 779 Cluster's further risk to human health and the environment is minimal

The other buildings which are part of the Building 779 cluster but not in the first three sub-units will be decommissioned in parallel with or after the sub-units, depending on the building's support requirements (ie cooling tower support), available funds (primary considerations for the highest risk areas) and resources (if there are a limited number of craft labor, they will be assigned to the highest risk areas first)

3.3.3 Work Preparation

The usual work process occurs in three steps

1) The engineering package is developed

2) The engineering instructions are then coupled with job specific (building specific) requirements and details This package is modified and becomes the Integrated Work Control Package (IWCP)

3) The work is completed using the IWCP as work instructions

The engineering package focus is on the means and methods of completing a task but also contains details on how the specific tasks can be completed safely

The IWCP includes building limitations and operational requirements not required to be included in the engineering package The IWCP generally has more detailed steps on how to accomplish the work than the engineering package contains because the IWCP has input from the craft on which is the best way to complete the work The craft is normally not involved in the engineering package development

The Engineering Package development and IWCP process has been combined to develop work instructions for the Building 779 Cluster Decommissioning Project Therefore the engineering package will contain the additional building requirements and craft input

IWCP will be developed during walkdowns by the project dedicated engineering team The team will include personnel from the following groups Discipline Engineering, Radiation Engineering, Procurement Engineering, Construction Management, Crafts, Planning, Waste Management, and Industrial Health & Safety personnel This team approach will allow the package to address the required work tools and individual equipment necessary, utility needs, and system isolation points, as well as the planning, radiation protection, and health safety requirements necessary to accomplish each activity

The engineering packages will contain detailed work instructions for all activities The packages will include engineered radiation controls, health & safety practices, and waste management requirements, in addition to the decontamination, disassembly, and size reduction instructions The work instructions will be written such that they can be used directly as the Integrated Work Control Packages (IWCP) Isometric drawings, P & ID's and photographs will be used as tools to supplement the work instructions

As the equipment and systems are cleared from each sub-unit of the building, an additional engineering package will be developed to complete the removal of all remaining utilities to the area This will include the ventilation systems and all electrical power within the area

Separate engineering packages will be developed for each of the satellite buildings in the 779 cluster. For each satellite building the packages will include the utility isolation, decontamination, strip out and demolition instructions, as required

By preparing the engineering work packages with up front participation of all the responsible groups a more usable document will be developed. The work flow will be easier to manage because of the pre-planning and buy in of all the work groups The document preparation exercise will also aid in the project team building

The initial engineering package will clear Room 150 of all equipment, tooling, and furniture, but leave the ventilation, plant air, health physics vacuum, lights, and wall sockets operable. After this room has been cleared, a prefabricated containment will be erected The remainder of the removal packages will be developed to conduct in-place decontamination of equipment and systems as directed by radiation engineering The package will then direct that the equipment to be moved from their existing location into the Room 150 enclosure for further decontamination, size reduction and waste packaging

A second room will be cleared to use as a staging area for packaged waste This room may be used to store low level the waste until it can be assayed and moved to the final destination

The engineering team will develop work packages prior to the initiation of decommissioning activities within an area Packages will be developed to conduct work activities both inside and outside of the contaminated area of the building This will allow continuous work activities to be conducted in an efficient and cost effective manner The final engineering package will be a demolition plan for building 779 This plan will detail the work steps and precautions required to accomplish final demolition of the building structure

4.0 FACILITY CHARACTERIZATION

4.1 Introduction

The decommissioning of Building 779 requires that the physical, radiological and chemical condition of the facility be assessed Characterization will be achieved through a combination of facility walkdowns, review of historical records, interviews of personnel familiar with building operations, direct measurement, non-destructive assay, and sample collection for laboratory analysis. The characterization data will be utilized for assessing potential hazards, waste management, basis for the development of the technical approach to decommission, and support the unconditional release of property/waste. Facility characterization is an iterative process that will build on exist information and continue through the decommissioning project

Characterization performed to support decommissioning activities will utilize the characterization results collected during deactivation The information collected on the condition of the facility assemble during Deactivation will be turned over to the Decommissioning Project in the form of the project close-out report and the endpoint document This will include the location and quantify of any holdup, gross presence and location of loose and fixed radiological contamination, location and level of known chemical hazards and the location and contents of stored materials

The results of characterization activities will be used to support decision making both prior to beginning decommissioning activities as well as throughout the decommissioning process. As such, the data will be available to project decision makers, engineering, health and safety, radiological engineering and decommissioning workers The characterization results will be an integral part of the decommissioning planning basis for both the DOP and the more detail work planning documents such as the IWCPs

Characterization will be an ongoing process throughout decommissioning and will be implemented in four basic phases as defined below

- **Reconnaissance Level Characterization Survey**

A survey and report designed to collect in a single document sufficient information to establish a planning basis concerning the physical, chemical and radiological conditions of the facility Characterization includes facility walkdowns, review and analysis of available characterization data and additional assessments, as required, to complement existing data The Reconnaissance Level Characterization Survey Report will serve as the technical basis to develop preliminary project details and will be provided to the lead regulatory agency

- **Process Survey**

Process surveys are routine radiological, industrial hygiene, and chemical sampling conducted during decommissioning activities to assess equipment, component and building surface contamination levels These surveys will provide detailed and current information on pre-job conditions and provide an indication on the effectiveness of decontamination and decommissioning actions

- **Final Decommissioning Survey**

The final decommissioning survey is conducted to demonstrate that the radiological, chemically hazardous, and/or toxic contaminates within the facility have been reduced to levels that comply with the established release criteria The final decommissioning survey report will included as part of the project administrative record and turned over to Environmental Remediation for final site Remediation, as required

- **Confirmatory / Verification Survey**

This survey is conducted to verify that the facility and/or material removed meets established release criteria The confirmatory/verification survey is normally performed by a third party, which provides an independent review of the final decommissioning survey methodology and survey data

4 2 Reconnaissance Level Characterization Survey

The detailed result of the Reconnaissance Level Characterization Survey are contained in the Reconnaissance Level Characterization Report (RLCR) Provided in this section is a discussion of the purpose of the survey and how the information it contains was used to develop the DOP Appendix 3 contains a hazard summary matrix for each room of the Building 779 Cluster The hazard matrix identifies the hazards that are known or likely to be present This information was used to develop the general decommissioning approach for Building 779

The reconnaissance level characterization has been performed for this project to establish a preliminary estimate of the type of the physical, chemical, and radiological hazards of the facility This includes the assembly and review of existing characterization data, taking samples, and conducting inspections designed to complement existing information The purpose of the characterization activities is (1) to evaluate the physical and chemical characteristics of radiological and hazardous material contamination and the extent of contaminant distribution, (2) to assess the environmental parameters that effect potential human exposure from existing and residual radiological or hazardous material contamination, (3) to support the preparation of detailed decommissioning work plans, Decommissioning Operations Plan (DOP), and including the preferred approach for decontamination, equipment removal, and waste disposal, (4) to estimate the type and amount of waste to be generated during decommissioning, (5) to support required project plan considerations of dose assessments and As Low As Reasonably Achievable (ALARA) analyses

The Reconnaissance Level Characterization Survey was designed to gather sufficient information to establish a baseline of information concerning the physical, chemical asbestos, and radiological condition of the facility This includes taking samples or conducting inspections designed to fill the gaps in the information currently available The Reconnaissance Level Characterization Survey is intended to serve as the technical basis to develop preliminary project details including cost, schedule, risk estimates, decommissioning project engineering approaches and estimates for the type and volume of waste generated The Reconnaissance Level Characterization Survey is a planning tool which will be supplemented and further refined by pre-job and in-process characterization data It is not intended, nor appropriate, to consider the Reconnaissance Level Characterization Survey as the final, wholly comprehensive, assessment upon which worker protection and safety decisions will be made Additional radiological, industrial hygiene, and safety characterization will be performed, as required, to prepare appropriate work authorization documents such as Radiological Work Permits, ALARA reviews, Integrated Work Control Packages and job hazard analysis (JHA) This type of characterization data will typically be obtained shortly before work is initiated to ensure conditions have not changed and to more accurately assess the hazards based on a detailed work plan In addition, in-process characterization data will be used to assess the hazards associated with inaccessible areas and systems This approach is both protective of the worker and environment and ensures the most cost effective collection of data

The Reconnaissance Level Characterization Survey included the following elements

- Review of Historical Information
- Identify Contaminants of Concern
- Define Initial Survey and Sampling Plans
- Specify Data Quality Objectives
- Conduct Sampling and Measurement
- Review, Analyze, and Verify Data
- Prepare Reconnaissance Level Characterization Report

A systematic review of information about the history of the facility was performed Historical information reviewed consisted of records or recollection of process knowledge, process upsets or unusual events, and/or previous surveys and measurements The RLSR contains a list of the documents that have been reviewed as part of the characterization effort Report This information was used to narrow the list of potential contaminants and optimize the design of additional characterization sampling and measurement

The following contaminants of concern have initially been identified based on an analysis of the proposed work, facility history, walkdowns, and process knowledge If other contaminants are being identified during the course of decommissioning, or additional information becomes available, these contaminants will be included ,as appropriate, in future characterization efforts

Plutonium	-	Interior of gloveboxes and ventilation systems
Lead	-	Painted surfaces and shielding
Asbestos	-	Thermal system piping, tile, adhesive
Beryllium	-	Building and equipment surfaces
Acids	-	Nitric, sulfuric, and hydrochloric
PCBs	-	Electrical transformers
Uranium	-	Interior of gloveboxes and ventilation systems
Solvents	-	Laboratory Chemicals

4.3 Radiological Characterization

The radiological characterization of the facility and equipment will make use of existing operational radiation protection survey supplemented by additional surveys to determine the presence and/or level of contamination The radiological monitoring of radiation exposure levels, contamination, and airborne radioactivity will comply with requirements of 10 CFR 835, Rocky Flats Environmental Technology Site (RFETS) Radiological Control Manual and implementing procedures The characterization surveys will be performed by only trained and qualified personnel using instruments that are properly calibrated and routinely tested for operability The results of radiological surveys will typically be documented on a map. The documentation will contain sufficient detail to permit identification of original survey and sampling locations

Using the facility operational and radiological history, biased sampling locations will be selected to quantify radioactivity based on suspected, or known, contamination at a given location Examples include horizontal surfaces such as the tops of gloveboxes and piping in overhead areas Unbiased locations of unaffected areas will selected at random Examples of these areas include office areas and areas where radioactivity is not expected

4.4 Asbestos Characterization

The objective of the asbestos material characterization is to determine the type, quantity and location of asbestos containing building material (ACBM). The characterization of the building will be conducted in several phases These phases will correspond to the work areas identified by the overall building decommissioning schedule In all cases materials will be characterized prior to the disruption or removal of suspect materials

Asbestos material characterization includes a review of documents detailing facility history, facility construction drawings, facility walkdowns, sample collection and analysis, and evaluation and documentation of results and conclusions The asbestos characterization survey will be designed and managed by a qualified individual per the requirements of 29 CFR 1926 1101 Samples will be collected at locations identified during the review of facility drawings and walkdowns Surveys will be performed by trained individuals who follow written procedures All samples will be tracked from sample collection, transport, and analysis All samples will be analyzed at a certified laboratory Data will be recorded in an orderly and verifiable manner and will be reviewed by a qualified Building Inspector for accuracy and consistency A report will be prepared summarizing laboratory results including sample location, sample description, asbestos type and percent, non-asbestos fiber types, matrix types and sample color

4.5 Beryllium Characterization

Work areas and equipment where beryllium is known or suspected of being present will be surveyed prior to disruption or removal of such items or surfaces Be smears will be collected and analyzed from various equipment and surfaces within the facility Sampling and analysis will be conducted in by trained individuals in accordance with the RFETS Beryllium Control Program

4.6 Lead Characterization

Lead shielding and lead-based paint is known to be present in the facility The general approach will be to assume that all painted surface are lead-based unless proven otherwise This approach will minimize characterization costs and ensure worker protection Selected lead sampling will be conducted by collecting media samples for analysis and/or with portable lead detection equipment The sampling and analysis will be conducted by trained individuals using wrtten procedures

4.7 Documentation

During characterization activities, several direct, indirect, and sample media samples will be measured, obtained, and analyzed for radiological and hazardous material contaminants The results will be used to determine the extent and magnitude of the contaminants and the basis for estimating waste quantities and decontamination options Sample collection, analysis, and the associated documentation will follow standard written procedures and meet the recommendations and requirements of applicable regulatory agencies A chain of custody sample tracking form will be used for each sample collected to account for the sample from collection to the point of analysis Samples will be collected and documented in accordance with Laboratory Procedure No L-6294-A "Sampling Within a RBA/CA" Results of all characterization activities will be documented in applicable field notebooks and summarized in a brief characterization report This report will be distributed to appropriate project personnel to support decisions made for waste management, industrial hygiene, decontamination, and other activities which may involve hazardous and radiological contaminants Radiation protection for the sampling event and the sampling team will be addressed under a Radiological Work Permit Additional personal protective equipment for the sampling activity will be as specified by Industrial Hygiene

8 0 FACILITY WASTE MANAGEMENT

Anticipated waste types, the required waste management activities associated with decommissioning, and the estimated volumes of waste are contingent upon completion of deactivation activities as proposed in the Building 779 Cluster Work Summary Plan, BDP-779-003 Waste types which may result from the decommissioning of the Building 779 Cluster are solid and liquid radioactive, mixed, hazardous and industrial waste Waste generated as a result of decommissioning activities will be managed in accordance with all relevant RFETS waste operations procedures State and federal regulations and DOE Orders have been incorporated into the RFETS Waste Operations Procedures

8.1 TRANSURANIC (TRU) WASTE

Transuranic waste is defined as waste that is contaminated with alpha-emitting transuranic radionuclides having half-lives greater that 20 years and concentrations greater than or equal to 100 nCi/gram at the time of assay Transuranic waste, as defined, may result from the decommissioning of Building 779 Historical knowledge suggests that less than 5% of the radioactive waste resulting from decommissioning will be greater or equal to 100 nCi/gram Duct work and gloveboxes are the suspect items which may result in the production of TRU waste Items will be decontaminated to the lowest level feasible in order to minimize the production of TRU waste

8.2 LOW LEVEL (LL) WASTE

Low level waste is defined as radioactive waste that is not classified as TRU waste, spent nuclear fuel, or by-product material as identified in DOE Order 5280 2A, Radioactive Waste Management Low level waste contains less than or equal to 100 nCi/gram radioactivity Approximately 95% of the contaminated waste produced as a result of Building 779 decommissioning activities is anticipated to be low level in nature Where feasible, items will be decontaminated to free release conditions Items that have been decontaminated to a free release condition Items that have been decontaminated to a free release condition will be transferred for use at a different location within RFETS for use at different DOE facilities or sent to the property utilization and disposal (PUD) organization

8.3 MIXED WASTE

Mixed waste is defined as waste containing measurable amounts of radioactive and RCRA constituents At RFETS mixed waste is characterized as either low level or transuranic based upon the amount of radioactivity at the time of assay The Building 779 Decommissioning Project anticipates a minimum amount of mixed waste The type of mixed waste that may be generated includes, but is not limited to, radioactively contaminated lead, glovebox gloves, used pump oil, and leaded glovebox windows Mixed waste that results from decommissioning activities will be stored in permitted areas on-site or, where feasible, shipped to an approved off-site disposal site

8 4 HAZARDOUS WASTE

A hazardous waste is defined as waste that exhibits the characteristics of corrosivity, ignitability, reactivity, or toxicity or that is listed in 6 CCR 1007-3, Section 261, 40 CFR 261, or 40 CFR 261, Subpart B Mixed waste is a subset of hazardous waste The Building 779 Decommissioning Project anticipates a minimum amount of hazardous waste in addition to the mixed waste mentioned in Section 7 3

8 5 INDUSTRIAL WASTE

Industrial waste is characterized as that waste which meets land fill requirements Industrial waste will be generated as a result of the Building 779 Decommissioning Project This waste will be managed in accordance with all applicable rules and regulations

8.6 WASTE MINIMIZATION

The philosophy of waste minimization will be utilized in the planning and management of Building 779 decommissioning wastes Waste minimization will be accomplished using a waste life cycle cost approach If the cost to demonstrate that the item is not contaminated exceeds the cost for waste disposal, the item will be disposed of as waste The evaluation may include disassembly, decontamination, and survey costs Elimination and reduction of waste generated as a result of decommissioning is high priority Standard decontamination operations and processes will be evaluated for waste minimization potential and suitable minimization techniques will be implemented

8.7 WASTE MANAGEMENT STRATEGY

The overall strategy for decommissioning of Building 779 will be approached on a room by room basis Typically, waste materials will be sorted at the time of removal and staged for further decontamination, survey, recycle, processing and packaging Due to the lack of funding this project maybe required to store waste generated in FY '97 at RFETS Shipment of waste generated in FY '97 will be funded in FY '98

8.8 WASTE CHARACTERIZATION

The Building 779 Waste Stream Residue Identification and Characterization (WSRIC) book is used to describe each of the processes which are performed in Building 779 The process descriptions identify the different types of chemicals used and wastes which are generated in completing the various processes The WSRIC is being used to help characterize the residual materials left in Building 779 (See section 4 0)

The Building 779 WSRIC has been revised to include anticipated decommissioning waste streams The Waste Management Plan for the Building 779 Cluster was developed using the WSRIC information to forecast waste types which will be generated during the decommissioning effort

In general, waste generated from decommissioning includes contaminated and uncontaminated equipment, tools, electrical conduit systems, piping systems, gloveboxes and facility structural materials Decontamination will be performed in conjunction with decommissioning to remove radiological contamination and hazardous constituents Waste resulting from decontamination activities will be managed in accordance with Procedures 1-M12-WO-4034, Radioactive Waste Packaging Requirements, 4-D99-WO-1100, Solid Radioactive Waste Packaging Inside of the Protected Area, and 1-C80-WO-1102-WRT, Waste/Residue Traveler Instructions Residue excess chemicals will be disposed of through RMRS Waste Management Programs Non-routine waste origination logs (NRWOLS) will be generated, in accordance with procedure 1-I34-WO-1103-NRWOL, Non-routine Waste Origination Log Instructions, when waste is generated outside the scope of the WSRIC Hazardous materials and excess chemical swill be managed as waste, where applicable, and disposed of in accordance with established procedures Mixed waste will be stored on-site, in accordance with the Hazardous Waste Requirements Manual until the material can be shipped for final disposal Initial Waste Volume Estimates are identified in Tables 8 1 and 8 2

TABLE 8.1
BUILDING 779 WASTE MATRIX

Room #	Room Classif	Estm (ft3) Room Area	Dispos Vol Ft 3	LL Waste ft3	TRU Waste ft3	PU&D Ft3	Drums	Crates
001	RBA	246		0	0	246		
Main Hall flr 1	COLD	215				215		
100 Vestibule	COLD	187				187		
101 Hall	COLD	215		0	0	215		
101A	COLD	57		0	0	57		
103/103A 103B Mens Locker Rm	COLD	2572		0	0	2572		
104 Elevator	COLD			0	0			
105	COLD	152		0	0	152		
106	COLD	113		0	0	113		
107	COLD	513		0	0	513		
108	COLD	74		0		74		
109	COLD	249		0	0	249		
110	COLD	248		0	0	248		
110A	COLD			0	0			
111	COLD	250		0	0	250		
113	COLD	2960		0	0	2960		
114	COLD	1442		0	0	594		
115	COLD	3189		0	0	3189		
115A	COLD	878		0	0	878		
116 Hall to Dock	COLD	646		0	0	646		
116A	COLD			0	0			
116B	COLD			0	0			
117	COLD	908		0	0	908		
118 Airlock								
119 Hall	RBA							
120	COLD			0	0			
121	COLD	1628		0	0	1628		
121A	COLD	414		0	0	414		
121B Guard Stat	COLD	174		0	0	174		
122	RBA	1348		0	0	1348		
123	RBA				0			
124	RBA	332		0	0	332		

TABLE 8 1
BUILDING 779 WASTE MATRIX

Room #	Room Classif	Estm (ft3) Room Area	Dispos Vol Ft 3	LL Waste ft3	TRU Waste ft3	PU&D Ft3	Drums	Crates
125	RBA				0			
126	RBA	1055	1271	1271	0	38		11
127	RBA	6989	8244	8244	0	395		74
128	RBA	174	13	13	0	173		5
129	RBA				0			
130	RBA	57 5	72	72	0	0		1
131	CA	962	1046	1046	16	125	2	9
132	RBA	374	252	253	0	172		2
133	CA/HCA	1485	1843	1843	16	111	2	17
134	RBA	163	0	0	0	163		
135	RBA			0	0			
136	RBA	236	0	0	0	236		
137	RBA	1421	1323	1323	24	363	3	12
138 HALL	RBA	292	233	233	0	106		2
139	RBA	642	503	503	0	240	0 5	5
140	RBA	531	664	664	0	0		6
140A	RBA	289	330	330	0	25		3
140B	RBA	172	120	120	0	76		1
141	RBA	374	170	170	0	238		2
141A	RBA	348	276	276	0	128		3
141B	RBA	345	276	276	0	124		3
141C	RBA	200	149	149	0	81		1
142	RBA	819	623	0	0	196		
143 Airlock	CA	NONE						
144 Elevator	CA	NONE						
145	CA	174	35	35		146		0 5
146	CA	653	3	3		651		0
147	CA	26	8	8		18		0
148	CA							
149, Annex Hall	CA	420	450	450		60		4
150	CA	4007	4720	4720		860		42
151	CA	225	0	0	0	225		
152	CA	606	494	494	4	277	0 5	4
153	CA	36	54	54	0	0		0 5
153A	CA	55	83	83	0	0		1
153B	HCA				0			
154	CA	1938	2081	2081	16	273	2	19
155	CA	1157	1201	1201	16	196	2	11
156	CA	291	426	426	0	18		4
157	CA	971	1041	1041	0	138	0	9
159	CA	658	662	662	0	128		6

TABLE 8.1
BUILDING 779 WASTE MATRIX

Room #	Room Classif	Estm (ft3) Room Area	Dispos Vol Ft 3	LL Waste ft3	TRU Waste ft3	PU&D Ft3	Drums	Crates
160	CA	2217	2361	2361	24	328	3	21
160A	CA							
161	CA	57	72	72	0			1
162	COLD			0	0			
163	CA	83	104	104	0			1
164 Airlock	CA	None						
165	CA							
166	COLD			0	0			
167	COLD			0	0			
167A	COLD			0	0			
170 Dumb Waiter	CA	None						
171	CA							
172 Vault	CA	Inaccessible						
173	CA							
2 Flr Hall	CA	32	4	4	0	29		0
201	COLD	289		0	0	289		
201A/B	COLD	322		0	0	322		
202	COLD	633		0	0	633		
202A	COLD			0	0			
203	COLD			0	0			
204	COLD			0	0			
204A	COLD			0	0			
204B	COLD			0	0			
205	COLD			0	0			
206	COLD			0	0			
207	COLD			0	0			
207A	COLD			0	0			
207B	COLD			0	0			
207C	COLD			0	0			
208	COLD			0	0			
209	COLD			0	0			
210	COLD			0	0			
210A	COLD			0	0			
211	COLD			0	0			
212	COLD			0	0			
212A	COLD			0	0			
213	COLD	288		0	0			
214	COLD			0	0			
215Airlock	COLD	None						
216 Hall	CA	126	104	104	0	43		1
217	CA	1062	1063	1063	8	212	1	10
218	CA	1155			8		1	

TABLE 8 1
BUILDING 779 WASTE MATRIX

Room #	Room Classif	Estm (ft3) Room Area	Dispos Vol Ft 3	LL Waste ft3	TRU Waste ft3	PU&D Ft3	Drums	Crates
219	CA				0			
220	CA	1196	1029	1029	8	373	1	9
221	CA	245	139	139	0	134		1
221A	CA	126	55	55	0	82		0 5
221B	CA	145	64	64	0	94		1
221C	CA	79	46	46	0	42		0 5
222	CA	3130	3675	3675	28	190	3 5	33
222A	CA	185	50	50	0	0		0 5
223	CA	838	1018	1018	0	24		9
224	CA	116 3	145	145	0	0		1
225	CA	463	394	394	0	149	0	4
226 Stair	CA	None						
228	CA	4553	3641	3641	8	1640	1	33
229	CA	245	19	19	0	230	0	0
230	CA	159	40	40	0	127		0
231	CA	386	365	365	0	94	0	3
232	CA				0			
233	CA	333	13	13	0	323		0
234	CA	947	655	655	12	423	1 5	6
234A	CA	64	76	76	0	3	0	1
234B	CA	269	336	336	0	0		3
235	CA	446	520	520	0	30	0	5
236 Airlock		None			0			
237 Hall					0			
270	CA	593	566	566	4	140	0 5	5
271	CA	216	149	149	0	97	0	1
272	CA	578	631	631	0	72		6
273	CA	65	21	21	0	48		0
274	CA	123	99	99	0	44		1
275	CA	192	115	115	0	100		1
277	CA	100	53	53	0	58		0 5
			SUM	45666	192	30515	24 5	412 5

TABLE 8.2
BUILDING 779 LEADED GLOVEBOXES

Room	Item	Dimensions of Glovebox	Disposal Vol ft3
131	GB 131-A, lead epoxied on	3 5x3 5x4	3 92
131	GB 131-B, lead epoxied on	3 5x3 5x4	3 92
131	GB 131-D, lead epoxied on	4x3 5x4	4 48
131	GB 131-E, lead epoxied on	4x3 5x4	4 48
131	GB 961, lead bolted on	5x7x5	14
133	GB-953, lead epoxied on	3x4x5	4 8
133	GB-954, lead bolted on	3 5x6x4	6 72
133	GB-955, lead bolted on	3 5x9x4	10 08
133	GB-956, lead bolted on	6x4x3 5	6 72
133	GB-957, lead bolted on	7x3 5x4	7 84
133	GB-958, lead bolted on	5x10x6	24
133	GB-959, lead epoxied on	4x18x3 5	20 16
137	GB-106-1, lead bolted on	5x4x3	4 8
137	GB-106-2, lead bolted on	4x4x3	3 84
137	GB-106-3, lead bolted on	4x4x3	3 84
137	GB-106-4, lead bolted on	4x4x3	3 84
137	GB-106-5, lead bolted on	4x4x3	3 84
152	GB-208, lead epoxied on	4x4x8	10 24
152	GB-211, lead epoxied on	3x9x3	6 48
154	GB-1363, lead bolted on	4 5x14x6	30 24
154	GB-1364, lead bolted on	4 5x14x6	30 24
154	GB-1365, lead bolted on	3x7x6	10 08
154	GB-4933, lead bolted on	3x7x4	6 72
154	GB-7248, lead epoxied on	3x6 5x4	6 24
160	GB-857, lead epoxied on	4x9x4	11 52
160	GB-859, lead epoxied on	11x3x4	10 56
160	GB-860, lead epoxied on	8 5x6 5x2	8 84
160	GB-863, lead epoxied on	3x2x4	1 92
160	GB-864, lead epoxied on	8x8x2	10 24
160	GB-865, lead bolted on	5x2 5x4 5	4 5
160	GB-866, lead epoxied on	6x4x3	5 76
160	GB-867, lead epoxied on	6x4x4	7 68
160	GB-868, lead epoxied on	2x3x3	1 44
218	GB-970, lead shielding around glove ports	1 5x1 5x3	36
220	GB-462, lead bolted on	3x9x4	8 64
220	GB-974, lead epoxied on	3x6x4	5 76
222	GB-460, lead bolted on	3 5x6x3 5	5 88
222	GB-105, lead bolted on	3 5x4x4	4 48
222	GB-230, lead bolted on	6 5x8x4	16 64
222	GB-3339, lead epoxied on	4x12x3	11 52
222	GB-330-371, lead epoxied on	8 5x4x3 5	9 52
222	GB-976, lead epoxied on	3x4x3 5	3 36

Room	Item	Dimensions of Glovebox	Disposal Vol ft3
222	GB-977, lead epoxied on	5x2x3 5	2 8
228	GB-199, lead epoxied on	3x4x8	7 68
270	GB-2115, lead epoxied on	3x6x3 5	5 04
270	GB-972, lead bolted on	3x3x3 5	2 52
270	GB-973, lead bolted on	3x3x3 5	2 52
		SUM	380 7

8.9 INTERIM STORAGE, TRANSPORTATION, AND FINAL DISPOSITION

The Building 779 Decommissioning Project will generate materials suitable for recycle and landfill disposal, as well as RCRA, low level radioactive, TRU and mixed waste The project is not anticipating significant amounts of TRU waste Although chemicals are to be removed during deactivation activities there could be some chemicals removed during the decommissioning process All materials and waste will be characterized, stored and disposed of in accordance with the requirements of the Site Waste Management Program, which meets the, State and Federal regulations Waste generated in FY '97 will be stored in approved areas within the building or other areas of RFETS Offsite transportation of waste to approved storage facilities will be funded in FY '98

9.0 REGULATORY AND COMPLIANCE ADMINISTRATION

All Decommissioning Actions will be in accordance with Site procedures and infrastructure which integrates all applicable state and federal regulations In addition, these actions will be completed as a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) removal action implementing both Rocky Flats Clean-up Agreement (RFCA) and the Decommissioning Program Plan (DPP) Actions beyond the scope of Decommissioning, such as Environmental Restoration activities, will not be addressed by this document

9.1 CERCLA REMOVAL ACTION

CERCLA was enacted by Congress in 1980 and amended by the Superfund Amendments and Reauthorization Act (SARA) in 1986 CERCLA is designed to address problems and readdress complaints associated with "hazardous substances " CERCLA was created to respond to situations involving the past disposal of hazardous substances at industrial sites As such, it complements the Resource Conservation and Recovery Act (RCRA) which regulates on-going hazardous waste handling and disposal CERCLA does not contain specific requirements, but section 121 codified EPA's existing approach to comply with other environmental laws which are applicable or relevant and appropriate

Non-Time Critical Removal Action (40 CFR 300 815) under CERCLA is the regulatory methodology currently identified for the completion of Decommissioning activities The Department of Energy (DOE) and the Environmental Protection Agency (EPA) issued the Policy on Decommissioning at DOE Facilities (May, 1995), providing the structure for actions taken at those facilities This policy was integrated in the Rocky Flats Clean-up Agreement (RFCA) and is implemented in the Decommissioning Program Plan (DPP) and this document

9.2 RFCA

The Department of Energy (DOE), Environmental Protection Agency (EPA), and the Colorado Department of Public Health and the Environment (CDPHE) has developed a TRI-party agreement, (called RFCA), for the cleanup of the Rocky Flats Environmental Technology Site RFCA directs the process for decommissioning by providing regulator inaction, time - table for CERCLA regulatory document review, and a regulatory approach utilizing single regulator oversight The provisions of RFCA comprise the legal document that describes the relationships between the Agencies during decommissioning actions This was completed by creating a common vision, 10 year plan, and implementable elements for near-term and intermediate site conditions, found in the preamble to the RFCA The building 779 cluster is being decommissioned to remove the risk associated with maintaining the facilities The decommissioning project is part of the ten year plan to put Rocky Flats in a safe environment status

This DOP will follow the Interim Measures/Interim Remedial Action (IM/IRA) process as specified in RFCA This document was constructed with consultation of the Lead Regulatory Agency (LRA) This document will be provided to the public, LRA, and CDPHE for a simultaneously review and comment period of 45 days Within 14 days after the review and comment period, DOE will develop responses to all comments and provide them to the LRA

The LRA then has 14 days to approve or disapprove the comment responses and resulting modified document, or the LRA may request an extension of the approval period based on good cause communicated to DOE in a timely manner If the LRA disapproves of any responses on the modified document the LRA shall provide specific direction on how the document can be modified to get LRA approval

9.3 Applicable or Relevant Appropriate Requirements

To ensure protection of human health and the environment, and to ensure proper management of remediation waste, the (LRA), in conjunction with the supporting regulatory agencies (SRA), is required to identify those promulgated standards, requirements, criteria, or limitations that will be met during the implementation of the remedy The identified promulgated standards, requirements, criteria, or limitations are called Applicable or Relevant Appropriate Requirements As defined in the National Contingency Plan National Contingency Plan, ARARs are as follows

> Applicable Requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility sitting laws treat specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site Only those standards that are identified by a State in a timely manner and that are more stringent than Federal requirements may be applicable (See 40 CFR 300 5)

> Relevant and Appropriate Requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility sitting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site Only those State standards that are identified in a timely manner which are more stringent than Federal requirements may be relevant and appropriate (see 40 CFR 300 5)

When determining the extent to which on-site CERCLA response actions must comply with other environmental and public health laws, one should distinguish between substantive requirements, which may be applicable or relevant and appropriate, and administrative requirements, which are not

Substantive requirements are those requirements that pertain directly to actions or conditions in the environment Examples of substantive requirements include quantitative health-or risk-based restrictions upon exposure to types of hazardous substances (e g , MCLs establishing drinking water standards for particular contaminants), technology-based requirements for actions taken upon hazardous substances (e g , incinerator standards requiring particular destruction and removal efficiency), and restrictions upon activities in certain special locations (e g , standards prohibiting certain types of facilities in floodplains)

Administrative requirements are those mechanisms that facilitate the implementation of the substantive requirements of a statute or regulation Administrative requirements generally include the approval of, or consultation with administrative bodies, issuance of permits, documentation, reporting, recordkeeping, and enforcement actions In general, administrative requirements prescribe methods and procedures by which substantive requirements are made effective for purposes of a particular environmental or public health program On-site response actions must comply with substantive requirements and not administrative requirements, except as provided in the Interagency Agreement (IAG) dated January 22, 1991

Types of ARARs

The EPA established the three ARAR categories listed below to identify and classify ARARs The categories are used as guidance since some ARARs do not necessarily fall into this classification system The type of ARAR is identified in the "Type" column in Table 1

- Chemical(C) - specific requirements are usually health or risk based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values These values establish the acceptable amount or concentration of a chemical that may be found in or discharged to the ambient environment (i e , air emissions, wastewater discharges, etc)
- Location(L) -specific requirements are restrictions placed on the concentration of hazardous substances solely because they occur in special locations Typical location restrictions include areas with sensitive or unique characteristics such as wetlands, areas of historical significance, or areas situated in locations requiring special precautions because of seismic activity or floodplains
- Action(A) -specific requirements are usually technology or activity based requirements or limitations on actions taken with respect to management of the remediation waste or closure of the facility These requirements are triggered by the particular remedial activities that are selected to accomplish a remedy

To-Be-Considered Standards

In addition to ARARs, the LRA and SRA may, when appropriate, identify other non-promulgated advisories, criteria, guidance documents, or proposed regulations that are to be considered (TBC) to supplement an ARAR provision for a particular release TBCs are typically issued by Federal or State governments, are not legally binding, and do not have the status as potential ARARs However, TBCs are used in determining the necessary level of cleanup for the protection of human health and the environment The March 8, 1990 preamble to the final NCP rule (see 55 FR 8746) indicates that the use of TBCs is discretionary rather than mandatory, however, their incorporation is recommended

Of particular importance to the RFETS is the inclusion of DOE Orders along with, or in lieu of other identified ARARs and TBCs Since DOE Orders are not promulgated standards, they do not qualify as ARARs under the CERCLA definitions Nevertheless, DOE Orders, whether promulgated or not, may be contractually enforceable on contractors that operate or manage a

DOE facility To the extent that DOE Orders supplement the implementation of an identified ARAR, they will be treated as TBCs to develop a protective remedy

State ARARs

Under NCP and CERCLA section 121, remedial actions must comply with ARARs which include State promulgated environmental regulations that are more stringent than Federal Environmental requirements and that are identified in a timely manner by the State The 1988 preamble to the NCP states that the phrase of general applicability is meant to preclude consideration of State requirements promulgated specifically for one or more CERCLA sites as potential ARARs For a state requirement to be a potential ARAR it must be applicable to all remedial situations described in the requirement, not just CERCLA sites (see 53 FR 51438) The March 8, 1990 preamble to the NCP defines the term "legally enforceable" to mean State regulations issued in accordance with pertinent State procedures and that "contain specific enforcement provisions or (are) otherwise enforceable under State law" (see 55FR 8746)

In terms of identifying more stringent State requirements as ARARs, Section 121(d) (2) (C) (iii) of CERCLA states that (A) state standard, requirement, criteria, or limitation (including any State sitting standard or requirement) which could effectively result in the statewide prohibition of land disposal of hazardous substances, pollutants, or contaminants shall not apply unless the following conditions are met

- The State standard, requirement, criterion, or limitation is of general applicability and was adopted by formal means,
- The state standard, requirement, criterion, or limitation was adopted on the basis of hydrologic, geologic, or other relevant considerations and was not adopted for the purpose of precluding on site remedial actions or other land disposal for reasons unrelated to protection of human health and the environment, and
- The State arranges for, and assures payment of the incremental costs of utilizing, a facility for disposition of the hazardous substances, pollutants, or contaminants

ARAR Identification Process

The process of identifying ARARs and TBCs is specified in CERCLA Section 121, 40 CFR 300 400 (g), 40 CFR 300 430 (e) (2), and 40 CFR 300 515 (d) In addition to the above mentioned statutory and regulatory requirements, the EPA has published the following guidance documents for identification of ARARs and TBCs

- CERCLA Compliance with Other Laws Manual Interim Final (EPA/540/G-89/006), August 1988,

- CERCLA Compliance with Other Laws Manual Part II Clean Air Act and Other Environmental Statutes and State Requirements (EPA/540/G-89/009), August 1989,

- Superfund LDR Guide #5 - Determining When Land Disposal Restrictions Are Applicable to CERCLA Response Action (OSWER 9347 3 - 05/FS), July 1989,
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- Superfund LDR Guide #7 - Determining When Land Disposal Restrictions Are Relevant and Appropriate to CERCLA Response Action (OSWER 9347 3-07FS), December 1989,
- ARARs Q&As Compliance with Federal Water Quality Criteria (OSWER 9234 2-09/FS), June 1990,
- ARARs Q&As Compliance with the Toxicity Characteristics Rule Part 1 (OSWER 9234 2-08/FS), May 1990,
- ARARs Q&As: General Policy RCRA, CWA, SDWA (OSWER 9234 2-12/FS), January 1991,
- ARARs Q&As The Fund-Balancing Waiver (OSWER 9234 2-13/FS), January 1991,
- CERCLA Compliance with Other Laws Manual RCRA ARARs - Focus on Closure Requirements (OSWER 9234 2-04/FS), October 1989, and
- CERCLA Compliance with Other Laws Manual Overview of ARARs - Focus on ARAR Waivers (OSWER 9234 2-03/FS), December, 1989

The process of identification of ARARs is described and graphically depicted in Section 1 2 4 of the CERCLA Compliance with Other Laws Manual Interim Final (EPA/540/G-89/006), August 1988 In general, the identification process involves a two-part evaluation to determine if the promulgated environmental requirement is applicable or, if not applicable, relevant and appropriate

The first step in this process is to determine if the requirement is applicable The basic criterion for determining if a requirement is applicable is that it directly and specifically addresses or regulates the hazardous substance, pollutant, contaminant, action being taken, or other circumstance at the site To determine if the particular requirement is legally applicable, it is necessary to refer to the terms, definitions, and jurisdictional prerequisites must be met for the requirement to be applicable In addition, previous court decisions could also play an important role in determining if a particular requirements applicable

If the requirement is not applicable, the second step is to decide if it is both relevant and appropriate The basic considerations to make this decision are to determine if the requirement 1) regulates or addresses problems or situations sufficiently similar to those encountered at the CERCLA site (i e., relevance), and 2) is appropriate to the circumstances of the release or threatened release such that its use is well suited to the particular site Determining if requirements are relevant and appropriate is site-specific and must be based on best professional judgement including the characteristics of the remedial action, the hazardous substances present at the site, and the physical circumstance of the site and of the release

The site-specific conditions must be compared to the statutory or regulatory requirements The EPA further clarifies that requirements determined to be relevant and appropriate do not need to be legally enforceable (see 55 FR 8743)

The ARARs will be implemented in the Integrated Work Control Package (IWCP) by direct reference to a procedure or by inclusion of a Site procedure modification This process provides a documented compliance step, with a signature of completion for each action, within the decommissioning process The ARARs list that follows will include the applicable requirement that have been identified for this Decommissioning Action, 779 Cluster, and document the associate regulation for each requirement Also identified is the Site's procedure that implements these requirements

9.4 ENVIRONMENTAL ISSUES

The decommissioning efforts being completed by this Decommissioning Operations Plan are governed by RFCA RFCA dictates that the remedial actions are taken to meet the requirements of a non-time critical CERCLA action Therefore a separate National Environmental Policy Act (NEPA evaluation (EIS or EA) is not required as the NEPA values are included in the DPP which governs the decommissioning Program at RFETS

As specified in Site procedures, an Environmental Checklist shall be created for each project during the planning phase of that project This document will assist the project manager in the identification of any environmental issues The reconnaissance level characterization will document the status of these issues and provide a path or identify the need for additional sampling This characterization process id provided and documented in its section of this document The path that is created by this process will assist the project manager in his planning, cost, integration, and required documentation for this project

The 779 D&D building cluster all lies within an Industrial Area surface water sub-basin boundary roughly borders the south sides of Buildings 705 and 706, the west side of Building 779, the south side of Solar Pond 207A The majority of surface water in this sub-basin flows to a storm water drain east of Building 779 (North of Building 727)

Surface water samples from the 779 D&D building cluster drainage sub-basin will be collected using an automated station located to pull samples from the entire sub-basin's runoff The station will consist of an ISCO flow meter set to trigger an ISCO portable sampler when surface water runoff from a storm event and/or snow melt rises to a predesignated level A Geomation remote measurement and control radio- telemetry unit will be used to notify Surface Water personnel when a sample has been collected

Air issues associated with Building 779 will be addressed in an evaluation of APENS permit values for this action, as well as, annual air stack emissions reviews Required monitoring will be evaluated for each stage of the project

Other environmental issues will be addressed in the Reconnaissance Characterization Report with the materials identified, contamination of concern documented, and the process for confirmation of analysis The Waste management Plan will identify what streams will be generated, approximate volumes, Waste minimization, and any other requirements needed for a smooth transition of waste generated to the assigned Waste Acceptance Criteria

RCRA permitted units currently located in Building 779 will be closed by the Deactivation Group or with sperate regulatory documentation

The "functional equivalency" exception to NEPA will also be met by implementing the Clean Air Act, the Resource Conservation and Recovery Act, the Toxic Substance Control Act and the Safe Drinking Water Act as ARARs for the Building 779 Decommissioning Project

The Building 779 Cluster facilities are located within the RFETS protected area After the decommissioning efforts described in this document have been completed the area's custodianship will be transferred the Environmental Restoration (ER) organization so that ER can complete the final remedial actions

9.5 PERMIT IMPACTS

An evaluation of impacted permits will be conducted Air issues will be documented, whether one exits or not, in a letter to file indicating requirements for monitoring, development of APEN, and/or appropriate methodologies to minimize the origination of an effluent Water issue will be identified and monitoring will continue with a baseline of at least one month to identify deviations Waste will be generated by a site approved waste generator and shall be managed in accordance with the waste management plan for this project Notification to Waste Management should be given as far in the further as can be provided to allow them to identify final disposal sites, conduct waste minimization, and develop new treatment process for these waste streams RCRA permitted unit will be closed in accordance with State regulation and the Rocky Flats Part B Permit

9.6 HUD/HISTORICAL SITE

Building 779 is currently on the National Historical Register because of its utilization in the defense effort of our nations past REFTS has requested that Building 779 and its support facilities past utilization be removed from the registry through an appropriate removal process that documents the facilities through facility documentation and photographs This action is on-going and will be completed prior to commencement of decommissioning

9.7 PROPERTY ACTIONS

The Building 779 Cluster equipment removed during Decommissioning will be evaluated for reuse at RFETS or other federal facilities by the Property Utilization and Disposition (PU&D) organization The equipment free-released (verified as uncontaminated) form the Building 779 Cluster is sent to PU&D for disposal or transfer

TABLE 1 - FEDERAL AND STATE ARARs FOR THE DECOMMISSIONING OF BUILDING 779 CLUSTER

Requirement	Citation	Type	Comment/Implementation Process
ATOMIC ENERGY ACT (AEA) [42 USC 2200 et seq]			
RADIATION OF THE PUBLIC AND THE ENVIRONMENT • Radiation Protection Standard - All Pathways • Radiation Protection Standard - Airborne Emissions • ALARA Process • Effluent Discharges to Surface Waters • Effluent Discharges to Sanitary Sewer Systems • Residual Radioactivity Levels (Real Property, Materials, and Equipment) • Monitoring and Surveillance	DOE Order 5400 5 {10 CFR 834, Proposed} Chapter II 1a and III {834 101} Chapter II 1b {834 102} Chapter II 1c {834 109} Chapter II 2 {834 11} Chapter II 3a {834 201} Chapter II 5 and IV {834, Subpart D} Chapter II 6 {834 10}	TBC	This DOE Order establishes criteria for the protection of human health and the environment to ensure radiation exposure resulting from DOE activities does not exceed an effective equivalent dose for 100 mrem per year This radiation dose limit also forms the basis for the release of radionuclides to the environment and the release of properties for unrestricted use This is implemented through the sites Radiological Controls Manual and Site Dosimetry Program Radiological Work Permit controls personnel exposure for any one event
ENVIRONMENTAL RADIATION PROTECTION STANDARDS FOR MANAGEMENT AND DISPOSAL OF SPENT NUCLEAR FUEL, HIGH LEVEL, AND TRANSURANIC RADIOACTIVE WASTE - Radioactive Dose Standards	40 CFR 191 03	C	Standards apply to TRU waste only
RADIOACTIVE WASTE MANAGEMENT • Management of Transuranic Waste - Temporary Storage at Generating Sites • Management of Low-Level Waste - Performance Objectives - Performance Assessment - Waste Characterization - Disposal - Disposal Site Closure/Post Closure - Environmental Monitoring	DOE Order 5820 2A Chapter II 3e Chapter III 3a 3b 3e 3i 3j 3k	TBC	Waste Management Operations Procedures, 1001-1103, implement these guidance function into all Radiological Waste Streams
STATE OF COLORADO LOW LEVEL WASTE	6 CCR 1007-14	A	Same as above
OCCUPATIONAL RADIATION PROTECTION	10 CFR 835	C/A	Radiological Control Manual and RadCon Procedures implement this function

A - Action Specific ARAR
C - Chemical Specific ARAR
L - Location Specific ARAR
TBC - To Be Considered

TABLE 1 - FEDERAL AND STATE ARARs FOR THE DECOMMISSIONING OF BUILDING 779 CLUSTER

Requirement	Citation	Type	Comment/Implementation Process
CLEAN AIR ACT (CAA) [42 USC 7401 et seq]			
AMBIENT AIR QUALITY STANDARDS	5 CCR 1001-14 [40 CFR 50]	C	National Ambient Air Quality Standards (NAAQS) are considered to be chemical-specific ARAs to assess the quality of ambient air and the need to remediate a particular IHSS to maintain the quality of the ambient air The site's Air Monitoring Program is implemented in 4D21-ENV-AQ 11 and several level four procedures
COLORADO AIR POLLUTION REGULATIONS • Emission Control Regulations of Particulates, Smokes, Carbon Monoxide, and Sulfur Oxides - Particulates - Emission Monitoring Requirements for Existing Sources -Sulfur Dioxide Emission Regulations • Air Contaminant Emissions Notices • Standards of Performance for New Stationary Sources • Control of Hazardous Air Pollutants • Emissions of Ozone-Depleting Compounds	5 CCR 1001 [40 CFR 52, Subpart G] [5 CCR 1001-3] [5 CCR 1001-5] [5 CCR 1001-8] [5 CCR 1001-10] [5 CCR 1001-19]	A	Regulation No 1 Section III D(2)(b), (e), (f), and (h) requires control measurements to be implemented for construction activities, haul roads, haul trucks, and demolition activities, respectively, to prevent the emission of fugitive particulates in excess of air standards Regulation Nos 3, 6, 7, 8, and 15 would be an ARAR only if the remedial action involves the specific emission source regulated The Site's Air Monitoring Program is implemented in 4D21-ENV-AQ 11 and several level four procedures
NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS • National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities - Standard - Compliance and Reporting	40 CFR 61 Subpart H 92 93	C/A	Demonstration of compliance with 40 CFR 61 92 is performed on a sitewide basis taking into consideration all RFETS sources Stack monitoring is required for all release points which could contribute greater than 0 1 mrem/yr The Site's Air Monitoring Program is implemented in 4D21-ENV-AQ 11 and several level four procedures
COLORADO AIR QUALITY CONTROL COMMISSION • Part B - Emission Standards for Asbestos	Regulation 8	A	Integrated into site procedure for Asbestos and training requirements for Decommissioning workers The Site's Air Monitoring Program is implemented in 4D21-ENV-AQ 11 and several level four procedures

A - Action Specific ARAR
C - Chemical Specific ARAR
L - Location Specific ARAR
TBC - To Be Considered

TABLE 1 - FEDERAL AND STATE ARARs FOR THE DECOMMISSIONING OF BUILDING 779 CLUSTER

TBC - To Be Considered Requirement	Citation	Type	Comment/Implementation Process
FEDERAL WATER POLLUTION CONTROL ACT{aka Clean Water Act (CWA)} [33 USC 1251 et seq]			
COLORADO BASIC STANDARDS AND METHODOLOGIES FOR SURFACE WATER • Antidegradation Rule • Water Quality-Based Designations • Basic Standards Applicable to Surface Waters of the State • Testing Procedures	5 CCR 1002-8 3 1 8 3 1 11 3 1 12 3 1 16	C	Non-AEA radionuclides that have Statewide surface water standards will be considered potential ARAR's Site-specific standards not associated with a use classification and AEA regulated radionuclides are not ARARs because they do not meet the criteria of "general applicability" and/or enforceability in 40 CFR 300 400(g)(4) and are, therefore, not "promulgated " Implementation of these requirements are found in Site EMD Standard Operation Procedures, Vol IV SW 02
COLORADO BASIC STANDARDS FOR GROUND WATER • Classifications of Ground Water • Ground Water Quality Standard • Point of Compliance	5 CCR 1002-8 3 11 4 3 11 5 3 11 6	C	Implementation of these requirements are found in Site EMD Standard Operation Procedures, Vol IV SW 02

Requirement	Citation	Type	Comment/Implementation Process
OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA)			
OSHA Standard for Construction Activities	29 CFR 1926	A	This is implemented in the Health and Safety Manual for Decommissioning

A - Action Specific ARAR
C - Chemical Specific ARAR
L - Location Specific ARAR
TBC - To Be Considered

TABLE 1 - FEDERAL AND STATE ARARs FOR THE DECOMMISSIONING OF BUILDING 779 CLUSTER

Requirement	Citation	Type	Comment/Implementation Process
SOLID WASTE DISPOSAL ACT {aka Resource Conservation and Recovery Act) [42 USC δ 6901 et seq] SUBTITLE C HAZARDOUS WASTE MANAGEMENT [Colorado Hazardous Waste Act (CRS δδ 25-15-101 to -217)]			
The State of Colorado is authorized to administer portions of the hazardous waste management program (e g , RCRA) to regulate the generation, treatment, storage, and disposal of hazardous waste within Colorado As such, the Colorado regulations would be applicable to the management of hazardous waste These regulations may also be relevant and appropriate in situations where a remediation waste is "sufficiently similar" to a RCRA-listed waste (e g waste which was generated and disposed of prior to the effective date of regulation) or when the proposed remedial action is similar to a RCRA-regulated activity and would be appropriate to ensure that the activity is protective of human health and the environment Although the Colorado hazardous waste management regulations are similar to the federal requirements, both the federal and the state regulatory citations are provided for reference purposes and to denote that both federal and state requirements were considered in establishing the identifying the ARAR requirement adopted for remediation of the RFETS Only substantive portions of the regulations are required under CERCLA actions for onsite activities			
IDENTIFICATION AND LISTING OF HAZARDOUS WASTES	6 CCR 1007-3, 261 [40 CFR 261]	A	RCRA Requirements are implement through the Hazardous Waste Requirements Manual (1-10000-HRM))
GENERATOR STANDARDS • Hazardous Waste Determinations • Record Keeping and Reporting Requirements - Record Keeping and Reporting Requirements	6 CCR 1007-3, 262 [40 CFR 262] 11 40 to 43	A	Persons who generate solid wastes are required to determine if the waste is hazardous The definition and procedures contained in 6 CCR 1007-3, 261 [40 CFR 261] are to be followed to make this determination RCRA Requirements are implemented through the Hazardous Waste Requirements Manual (1-10000-HRM)
CONTINGENCY PLAN AND EMERGENCY PROCEDURES • Purpose and Implementation • Content of Plan • Emergency Coordinator • Emergency Procedures	6 CCR 1007-3, 264, Subpart D [40 CFR 264 Subpart D] 51 52 55 56	A	The existing RFETS contingency plan will be reviewed and revised accordingly to ensure that the procedures are adequate to respond to any new conditions posed by the remedial actions and/or the operation of new hazardous waste management facilities RCRA Requirements are implemented through the Hazardous Waste Requirements Manual (1-10000-HRM)

A - Action Specific ARAR
C - Chemical Specific ARAR
L - Location Specific ARAR
TBC - To Be Considered

TABLE 1 - FEDERAL AND STATE ARARs FOR THE DECOMMISSIONING OF BUILDING 779 CLUSTER

Requirement	Citation	Type	Comment/Implementation Process
SOLID WASTE DISPOSAL ACT (aka Resources Conservation and Recovery Act) [42 USC δ 6901 et seq] SUBTITLE C HAZARDOUS WASTE MANAGEMENT [Colorado Hazardous Waste Act (CRS δδ 25-15-101 to - 217)]			
MANIFEST SYSTEM, RECORDKEEPING, AND REPORTING • Applicability • Operating Record • Availability, Retention, and Disposition of Records	6 CCR 1007-3 Part 264, Subpart E [40 CFR 264, Subpart E] 70 73 74	A	RC Requirements are implement through the Hazardous Waste Requirements Manual (1-1000-HRM)
CLOSURE AND POST-CLOSURE • Closure Performance Standards • Disposal or Decontamination of Equipment, Structures and Soils • Maintenance, Monitoring, Security, and Care Post-Closure Use of Property	6 CCR 1007-3, 264 Subpart G [40 CFR 264, Subpart G] 111 114 117	A	RCRA Requirements are implemented throughout the Hazardous Waste Requirements Manual (1-10000-HRM)
USE AND MANAGEMENT OF CONTAINERS • Condition of Containers • Compatibility of Waste with Containers • Management of Containers • Inspections - Containment System Design and Operation - Containment for Ignitable or Reactive Wastes - Containment for Incompatible Wastes • Closure	6 CCR 1007-3, 264, Subpart I [40 CFR 264, Subpart I]	A	RCRA Requirements are implemented throughout the Hazardous Waste Requirements Manual (1-10000-HRM)

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TABLE 1 - FEDERAL AND STATE ARARs FOR THE DECOMMISSIONING OF BUILDING 779 CLUSTER

Requirement	Citation	Type	Comment/Implementation Process
SOLID WASTE DISPOSAL ACT (aka Resources Conservation and Recovery Act) [42 USC δ 6901 et seq] SUBTITLE C HAZARDOUS WASTE MANAGEMENT [Colorado Hazardous Waste Act (CRS δδ 25-15-101 to - 217)]			
TANK SYSTEM • Containment and Detection of Releases - Secondary Containment - Secondary Containment Devices -- External Liner -- Vault System -- Double-Walled Tanks -- Ancillary Equipment • Inspections • Response to Leaks or Spills and Disposition of Leaking or Unfit-for-Use Tank Systems • Closure and Post-Closure Care	6 CCR 1007-3 Part 264, Subpart J [40 CFR 264, Subpart J]	A	Either existing or new tank systems will be used to treat or store hazardous waste generated as a result of remedial activities Existing tank systems will only be used if it is determined that the tank system is adequate and has sufficient integrity to prevent failure of the tank system during the proposed new use Existing tank systems will be closed in accordance with approved closure plans or IM/IRA documents RCRA Requirements are implemented through the Hazardous Waste Requirements Manual (1-10000-HRM)
LAND DISPOSAL TREATMENT STANDARDS • General (Subpart A) - Dilution Prohibition as a Substitute for Treatment -Waste Analysis -Special Rules Regarding Wastes that Exhibit a Characteristic • Prohibitions on Land Disposal (Subpart C) - Waste Specific Prohibitions - Solvent Wastes - Waste Specific Prohibitions - Dioxin-Containing Wastes - Waste Specific Prohibitions - California List Wastes - Waste Specific Prohibitions - First Third Wastes - Waste Specific Prohibitions - Second Third Wastes - Waste Specific Prohibitions - Third Third Wastes - Waste Specific Prohibitions - Newly Listed Wastes	6 CCR 1007-3, 268 7 9 30 31 32 33 34 35 36	A	Waste Management plans will be developed to ensure compliance with the Land Disposal Restrictions The performance requirements for hazardous waste treatment systems will be based on the LDR Treatment Standards contained in Subpart C RRA Requirements are implemented throughout the Hazardous Waste Requirements Manual (1-10000-HRM)

A - Action Specific ARAR
C - Chemical Specific ARAR
L - Location Specific ARAR
TBC - To Be Considered

TABLE 1 - FEDERAL AND STATE ARARs FOR THE DECOMMISSIONING OF BUILDING 779 CLUSTER

Requirement	Citation	Type	Comment/Implementation Process
TOXIC SUBSTANCES CONTROL ACT (TSCA) [15 USC 2601 et seq]			
LABELING OF PCBs AND PCB ITEMS	40 CFR 761 40 AND 45	A	TSCA Requirements are implemented through the TSCA Requirements Manual (1-10000-TRM)
STORAGE REQUIREMENTS FOR PCBs • Time Limits • Facility Criteria • Temporary Storage • Inspections • Container Specifications • Marking • Laboratory Sample Exemption From Manifesting	40 CFR 761 65	A	TSCA Requirements are implemented through the TSCA Requirements Manual (1-10000-TRM)
DECONTAMINATION • Containers • Movable Equipment	40 CFR 761 79	A	TSCA Requirements are implemented through the TSCA Requirements Manual (1-10000-TRM)
PCB SPILL CLEANUP • Requirements for PCB Spill - Disposal of Cleanup Debris and Materials - Determination of Spill Boundaries - Spills of < 500 ppm PCBs, Involve, < 1 lb of PCBs by wt - Spills of ≥ 500 ppm PCBs, Involve, ≥1 lb of PCBs by wt - Time Limits and Actions Within the First 24 Hours - Requirements for Decontaminating Spills in Outdoor Electrical Substations - Requirements for Decontaminating Spills in Restricted Access Areas - Sampling Requirements	40 CFR 761 125	A	40 CFR 761 Subpart G is entitled *PCB Spill Cleanup Policy* and thus many of the sections in Subpart G, specifically for spills after May 4, 1987, are "to be considered" (TBC), 40 CFR 761 125 contains PCB cleanup requirements that may be considered enforceable substantive environmental standards and thus potential ARARs TSCA Requirements are implemented through the TSCA Requirements Manual (1-10000-TRM)

A - Action Specific ARAR
C - Chemical Specific ARAR
L - Location Specific ARAR
TBC - To Be Considered

10.0 QUALITY

10.1 INTRODUCTION

Meet contractual obligations and assure that the customers of RMRS are receiving products and services that meet their specifications, RMRS has developed a Quality Assurance Program Plan (QAPP) , document number 95-QAPP-001, that describes roles, responsibilities, and methodologies for ensuring compliance with DOE Order 5700 6C (the Order), and 10 CFR 830 120 (Price-Anderson Amendments Act, also known as the Rule) Since the Order and the Rule are inclusive of the same criteria, RMRS incorporates the requirements into a single QAPP The QAPP is a controlled document and is distributed through the RMRS document control system

The decommissioning of Building 779 will follow the requirements of the RMRS QAPP The development and approval of the Decommissioning Program Plan will further define the requirements applicable to quality assurance needs for decommissioning projects, and will be utilized to meet the governing Quality Assurance Program Plan

10.2 PURPOSE AND SCOPE

The RMRS QAPP defines the strategy and controls currently employed, or to be developed and implemented by RMRS to consistently deliver products and services that meet the requirements of customers/stakeholders The QAPP serves as a map of the current controls employed by RMRS, and presents a concise strategy for the continuing development of the RMRS QA Program Currently, RMRS is implementing the established Site controls, procedures and documents approved by the Integrating Management Contractor, Kaiser-Hill

The QAPP is relevant and applicable to the specific operations of RMRS and its subcontractors, and where applicable, to the interface controls between RMRS and Kaiser-Hill, and between RMRS and other Kaiser-Hill subcontractors

10.3 PROGRAM REQUIREMENTS

The QAPP identifies the QA elements of the RMRS QA Program and defines them in the context of implementing programs and controls Specific programs and controls are also identified in the QAPP, such as floor level procedures, plans, and documents used to control all activities involved in the 779 Decommissioning Project The QAPP is binding on all RMRS personnel RMRS personnel understand the program's impact from training, indoctrination, and the commitment evidenced by management

10.3.1 Quality Assurance Systems and Description

General

RMRS requires that decommissioning activities be appropriately planned in accordance with the provisions of the QAPP, and that when activities deviate from planned outcomes and indicate significant conditions adverse to quality, RMRS personnel are required to stop the activity until corrections can be made

RMRS places accountability for quality with the individuals accomplishing the work activities, and further holds those individuals accountable for seeking means to continuously improve RMRS provides its participants with the tools, continuing training, and latitude to do the right things, above merely doing things right

All RMRS personnel are responsible for performing activities in accordance with approved documents, identifying and participating in quality improvements, knowing customers, suppliers, and processes with which associated, exercising stop work authority over significant conditions adverse to quality, and for attending training

RMRS QA Organization

One of the key elements of an effective quality assurance program is identification of organizations and responsibilities Complete organizational descriptions and responsibilities are defined elsewhere in this document and in the QAPP, however, the following responsibilities are important to note from a quality perspective

The RMRS QA Manager is designated by the RMRS President as the representative for quality assurance activities, and is responsible and authorized to stop work when significant conditions adverse to quality are detected The QA Manager is responsible for assessing the effectiveness and compliance of RMRS to the quality concepts, requirements, and directives identified in this QAPP and associated implementing procedures The RMRS QA Manager is also responsible for documenting identified deficiencies, facilitating appropriate corrective actions, verifying corrective action effectiveness, and tracking deficiencies to preclude recurrence and promote continuous improvement

The QA organization has a designated group responsible for quality assurance program implementation and oversight of the Engineering/Construction/Decommissioning department The 779 Cluster Decommissioning Project is receiving QA support, and is taking a proactive approach in its work planning activities to ensure programmatic compliance and to streamline QA review cycles

The RMRS QA Program is inherent with the work being performed This is accomplished during the planning of work, through the participation of Quality Engineers, reducing the need for extensive inspections and assessments The primary principle supported is that the achievement of quality is embedded in the work processes, and that assessment should only be a tool for monitoring and continuous improvement

10.3.2 Personnel Qualifications and Training

Project personnel are qualified to perform their respective tasks based on a combination of related experience, education, and training Education and experience constitute the primary means of qualification Decommissioning management, in conjunction with training program administrators are responsible for providing any additional skills and training prior to assigning employees specific project duties Typical training methods include computer based training, classroom instruction, required reading, and on-the-job training Qualification requirements and training records are maintained and retrievable through the project manager, at a centralized training record repository, maintained and operated by RMRS

The RMRS QA Manager establishes requirements for the competency of individuals planning , developing, assessing, and inspecting QA related work activities Quality Engineers have the training, qualifications, technical knowledge, and experience commensurate with the scope and complexity of the decommissioning activities being evaluated Evidence of competency, and maintenance of competency has been established and recorded within the QAPP

10.3.3 Improvement

Employee participation in the assurance of quality and the continuous improvement process is gained through taking ownership of their processes, and actively seeking means to improve those processes Decommissioning project management will use lessons learned in each phase of the project to improve succeeding phases The project team approach is one of the management tools employed to enhance productivity and continuity throughout the project

As team members, Quality Engineers are able to identify problems early on and help implement actions to correct identified problems Specifically, the Quality Engineers matrixed to the project participate in the planning process, review work control packages prior to implementation, and conduct surveillances of work as it is being performed The QA group also supports process improvement through process reviews, audits, inspections, and planned surveillances

Items, materials and hardware that do not meet established requirements are identified, segregated, controlled, documented, analyzed and corrected in accordance with the Non-conformance Reporting (NCR) process Activities, services and processes that do not meet established requirements are also identified and corrected in accordance with the Quality Condition Reporting (QCR) process Quality Engineers are responsible for supporting the NCR and QCR processes, and for assisting in the disposition and correction of identified deficiencies

10.3 4 Documents and Records

Quality affecting documents, such as work plans, operating procedures, and health and safety plans are prepared and controlled in accordance with approved processes These documents receive the required reviews and approvals, they are uniquely identified, and their distribution is formally established Other essential policies, plans, procedures, decisions, data, and transactions of RMRS are documented to an appropriate level of detail Document reviews by subject matter experts, management and Quality Assurance are performed as appropriate and as specified in governing procedures

Quality records, as defined by approved processes and plans are prepared and managed to ensure that information is retained, retrievable, and legible The document and record processes for the 779 Cluster Decommissioning Project are the same as the established controls for all E/C/D projects, maintaining a consistent, and approved method

10 3 5 Work Processes

Decommissioning processes and activities are controlled to a degree commensurate with the risks associated with the decommissioning process or activity Documented and approved instructions are incorporated to control decommissioning processes and activities, maintaining compliance with reference standards, engineering specifications, workmanship criteria, quality plans or other requirements

Quality affecting activities are prescribed by and performed according to documented instructions, procedures, and drawings Additionally, the methods for creating and revising procedures are controlled

Work is controlled from the onset of the project through project management procedures, engineering procedures, records management procedures, construction management procedures, and work packages The Integrated Work Control Program (IWCP) is the formalized process that controls the development of the decommissioning work packages Well established Waste Management Procedures and other controls ensure that the generation and handling of wastes meet governing requirements as well

10.3.6 Design

Sound engineering, scientific principles, and appropriate technical standards are incorporated into all design activities to assure intended performance Site infrastructure programs, primarily The Conduct Of Engineering Manual, provide controls for the design of items and processes Design work includes incorporation of applicable requirements and design bases, identification and control of design interfaces, and verification or validation of design products by independent, qualified individuals, subject matter experts or groups other than those who performed the work The verification and validation is completed before approval and implementation of the design

The design control processes for the 779 Cluster Decommissioning Project are, existing, well established, approved and documented procedures for the control of design inputs, outputs, verifications, reviews, changes, modifications, and configuration change control Design control requirements for procured design and engineering services are also incorporated into procurement specifications

10.3.7 Procurement of Items and Services

The Decommissioning Program implements a procurement and subcontracts system that complies with the appropriate protocols required by the Site All procurement documents receive a documented independent quality review, Quality Engineers, to assure incorporation of appropriate quality assurance requirements and health and safety requirements The QA organization reviews procurement documents to ensure that the requirements for items and services are clearly depicted, including specific performance requirements Procurement documents are retained and administered in accordance with approved procedures

RMRS employs control systems for identification, maintenance, and control of items, including consumables The controls ensure that items are properly labeled, tagged, or marked, and that only appropriate items are used for the application Controls ensure that items are identified, handled, stored, transferred, and shipped in a manner that prevents loss, damage, or deterioration

10.3.8 Inspection and Acceptance Testing

Decommissioning activities or items that require inspections and/or acceptance testing will be specified in work-controlling documentation, such as IWCP work packages, operating procedures, data management plans, etc Acceptance criteria and hold points are clearly defined, in accordance with approved procedures Inspections are designed and controlled in accordance with approved processes Oversight and acceptance of services is performed in accordance with approved documents by qualified personnel from the Decommissioning Program staff or by the designated Quality Engineer

Testing is conducted when necessary to verify that items and processes perform as planned Testing activities are planned and implemented in accordance with approved procedures that include provisions for performing the test, item configuration, environmental conditions, instrumentation requirements, personnel qualifications, acceptance criteria, inspection hold points, and documentation requirements for records purposes Only controlled and calibrated measurement and test equipment are used for testing, measuring and data collection activities

10 3 9 Assessment Program

RMRS has established and maintains an assessment program and procedures for planning and implementing assessments Assessments are scheduled by an independent branch of the QA organization, based on the risk and QA performance indicators of the activities being conducted Assessments are conducted by qualified QA personnel, independent of the 779 Cluster Decommissioning Project The results of assessments are documented, brought to the attention of appropriate management, and are tracked to verify development and effective implementation of corrective actions

As previously indicated, the QA organization consists of personnel who participate with and are matrixed to the decommissioning organization These personnel conduct monitoring and surveillance activities as a continuous barometer of quality requirement compliance and implementation Decommissioning Program management also perform documented Management Assessments of the decommissioning organization to determine the effectiveness of the QA Program and overall organization performance

10.4 REFERENCES

The following references are utilized as sources for obtaining appropriate control requirements Additional reference documents concerning Quality Assurance are located in the RMRS QAPP

DOE Order 5700 6C, Quality Assurance, August 21, 1991

10 CFR 830 120, Quality Assurance Requirements, May 1994

Kaiser-Hill Team Quality Assurance Program

RMRS Quality Assurance Program Plan, 95-QAPP-001

11.0 FACILITY SECURITY

All the containerized special nuclear material (SNM) has been removed from Building 779 and the material access area (MAA) has been closed Building 779 has been downgraded to a Nuclear Material Safegaurds category 3 building (clearance required for free access) After the completion of the SNM consolidation and deactivation activities the building will be further down graded to a category IV

There are no special security requirements to access the Building 779 Cluster during decommissioning

12.0 PROJECT MANAGEMENT

The project management structure discussed in section 2 0 will be used to manage the Building 779 Cluster Decommissioning Project The project costs will be monitored using the RFETS microframe Project Manager System and the project schedule will be maintained using Primavera Project Planner System (P-3)

APPENDIX 1

1.0 BUILDING 779 CLUSTER DESCRIPTION

1.1 SCOPE

1.2 SUMMARY DESCRIPTION OF THE 779 COMPLEX

Main structures in the Building 779 cluster are the Research and Development facility, Building 779, a filter plenum and emergency generator building, Building 729, a filter plenum building, Building 782, the emergency generator facility, Building 727, a paint storage facility, Building 780, and a cooling tower, Structure 783 The facility was built in 1965 and has had several additions and modifications since then Building 779 is located in the north central section of the Rocky Flats plant site, east of Buildings 776/777 and north of Building 750

The building is constructed primarily of concrete block Interior walls are concrete block, transite, gypsum board, and acoustic paneling Floors are poured concrete, covered with vinyl-asbestos tile, carpet, or paint The roof is built up over rigid board insulation, supported by poured concrete on a metal pan

During 1988, the exterior containment of Building 779 was structurally upgraded to withstand a Design Basis Earthquake and Design Basis Wind

Building 779 was a facility for research and development activities in physical chemistry, physical metallurgy, machining and gauging technology, joining technology and process development The facility supported weapons production activities and was an essential component of the national security operations performed at Rocky Flats The areas in which these operations were located are described below

1.2.1 Description Of Facility

This section describes the physical arrangement of principal buildings in the Building 779 complex, their architectural and structural features, significant equipment, environmental control systems, and safety aspects of each The original Building 779 (1 in Figures 1 2-1 and 1 2-2) has been in use since May 1965 Since then, two major additions have been constructed The first addition (2 in Figures 1 2-1 and 1 2-2), also referred to as Building 779A, was built in 1968 The second addition (3 in Figures 1 2-1 and 1 2-2 was built in 1973 and is also referred to as Building 779B Two new filter plenum buildings for the complex were constructed Building 729 in 1971 and Building 782 in 1973

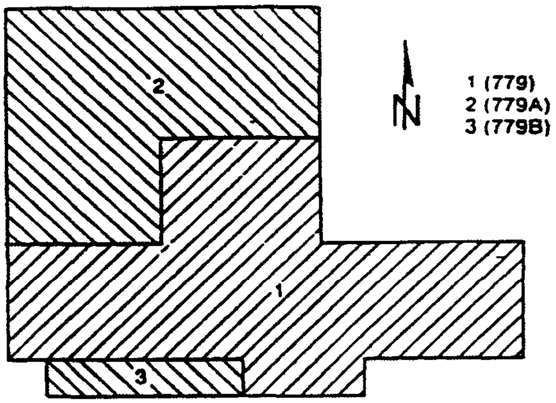

Figure 1.2-1 First Floor Key Plan, Building 779

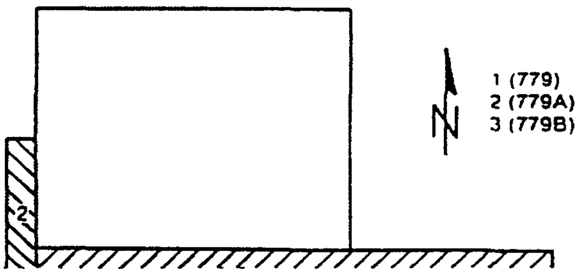

Figure 1.2-2 Second Floor Key Plan, Building 779

1 2.2 General Description

Main structures in the Building 779 complex are the development facility, Building 779, a filter plenum and emergency generator building, Building 729, a filter plenum building, Building 782, the emergency generator facility, Building 727, a paint storage facility, Building 780, and a cooling tower, Structure 783

Building 779 is the primary structure in the complex Ground-floor area (including a covered dock) is 42,800 square feet (ft^2), the second floor is 24,370 ft^2, and the basement is 540 ft^2, for a total of 67,710 ft^2 The building is roughly L-shaped The north-south leg is approximately 161 ft wide and 214 ft long The east-west leg is 62 ft wide and 101 ft long At its highest point, the building is 27 ft tall

Building 729, one of the two filter plenum buildings for Building 779, is rectangular in shape 72 ft long (east-west), 38 ft wide, and 30 ft high It is located south of Building 779 and is connected to it via a second-story, 8-ft-wide duct bridge

Building 782 is the other filter plenum building for Building 779 It is 60 ft wide by 99 ft long (north-south) and is located east of Building 779 The building is 20 ft high It is connected to Building 779 via a combination of an underground duct tunnel, a two- story vertical shaft, and an overhead duct

The emergency generator for Building 782 is in a separate concrete block structure, Building 727, east of Building 779 and north of Building 782

A cooling tower, Building 783, is located east of Building 779 and north of Building 727

A paint storage facility, Building 780, is a sheet-metal shed located east of the northeast corner of Building 779

In addition to the structures mentioned, heating, ventilating, air conditioning (HVAC), electricity, gas and compressed air, steam, water, process waste, sewer, fuel oil, and fire protection utility systems serve the complex

1.2.3 Building 779 Description

Primary functions of Building 779 are research and development There have been two major additions to the building The first addition (Building 779-2) provided supplemental office, laboratory, and mechanical equipment space Also, two large machine shop areas were added The second addition (Building 779-3) supplied more office and laboratory space, plus an environmental storage facility and a storage vault

First- and second-floor plans for Building 779 are shown in Figures 1 2-3 and 1 2-4 The facility has joining, coating, and electroplating laboratories, machine shops, environmental storage areas, facilities, offices, loading docks, locker rooms, a duct tunnel to Building 782, a second floor enclosed walkway to Building 777, and a second-floor duct bridge to Building 729

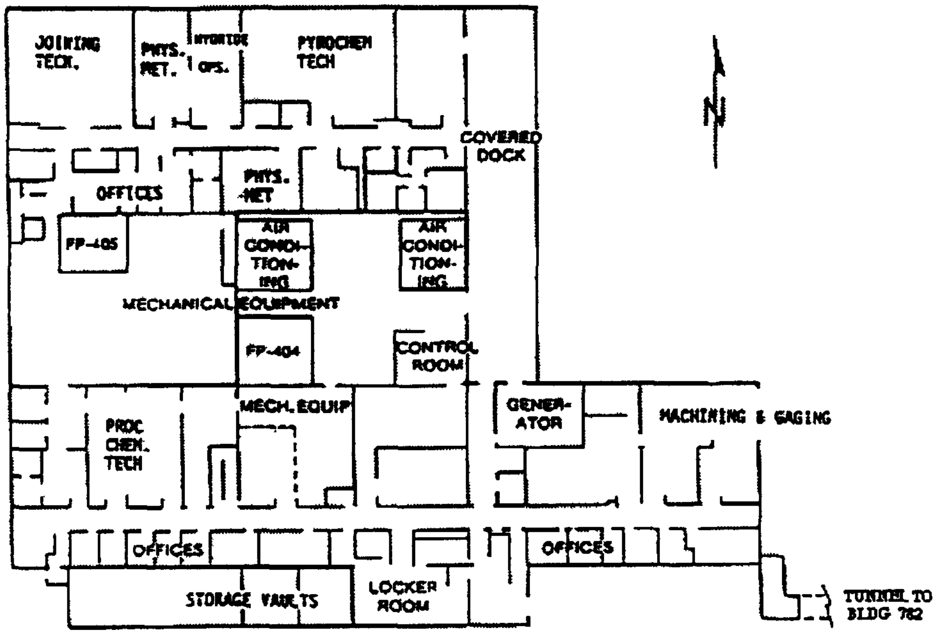

Figure 1.2-3 First Floor Plam, Building 779

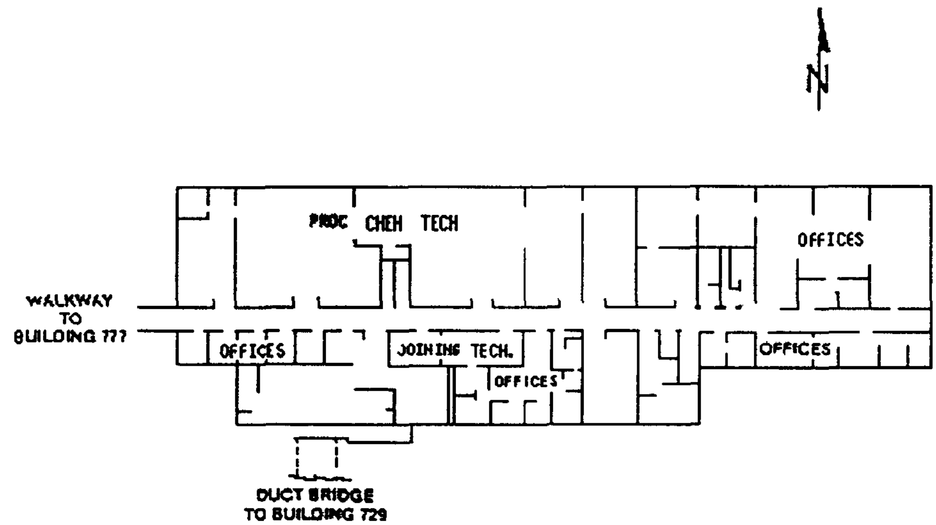

Figure 1.2-4 Second Floor Plan, Building 779

7"9 5 : 5/8"

1.2.3.1 Foundations

Foundations for Building 779 are horizontal, poured-in-place, reinforced concrete spread footings Dimensions vary from I ft 6 in square to 6 ft 6 in square and from I0 in to 16 in thick In depth below grade, they vary from 3 ft to 9 ft Reinforced concrete grade beams, 16 inches to 18 in wide and 10 in to 13 in thick, rest on the spread footings Concrete grade walls 10 1/2 in to 12 in thick and 4 ft 6 in deep support the exterior walls

1.2.3.2 Structural Framing

Three types of framing members are used in Building 779 Vertical concrete columns, cast-in-place and reinforced, 10 in by 14 to 16 in rectangular, rest on slab footings Structural steel columns, 8-in - deep, wide-flange I-beams encased in concrete, support an exterior passageway and an exterior wall of the original building Concrete block pilasters, 16 by 16 in , reinforced with steel, are used in the single-story portion of the original building

1.2.3.3 Exterior Walls

Exterior walls of Building 779 are hollow concrete block except for the 12-in -thick, poured-in-place, reinforced concrete wall of the storage vault and the metal stud and siding on a storage area on the east side of the first addition (Building 779-2) Concrete block walls are I0 to 12 in thick for the first floor and 8 in thick for the second floor There is horizontal trussed wire reinforcement in both interior and exterior hollow core concrete block walls, however, there is no vertical reinforcement Walls are insulated with either perlite fill between cavities or 2 in blanket insulation Outer surfaces of the blocks are painted The walls are designed to be the equivalent of 2-hr fire-rated walls

1.2.3.4 Floors

First-floor slabs in Building 779 are poured-in-place, reinforced concrete 6 to 8 in thick, with a barrier on a gravel base The second-floor slab in the original building is 3 1/2-in -thick reinforced concrete on concrete joists supported by concrete beams The second-floor slab of the second addition is 8-in -thick reinforced concrete on concrete joists supported by concrete beams

1.2.3.5 Roofs

Three different roof systems -are used on Building 779 The single-story portion of the original structure (I in Figure 1 2-1) is structural steel with 18-gage steel decking, insulation, and composition roofing The two-story portion of the original building and the second addition is a poured-in-place, reinforced concrete slab on concrete joists, supported by concrete beams The original building roof has insulation and composition roofing, whereas the second addition roof has 2 in of foamed-in-place urethane and silicone rubber roofing The first addition roof consists of precast concrete tees with 2 in of light-weight concrete, 4 in of perlite, and elastomeric roofing

1.2.3.6 Interior Walls

Most interior and exterior walls in Building 779 are painted concrete block Storage vault walls, which are of 12-in -thick reinforced concrete, are also painted Ceramic tile covers the block in locker room and restroom areas The interior surface of most exterior walls is gypsum board

1.2.3.7 Ceilings

Ceilings in offices and hallways are suspended acoustical tile Elsewhere in Building 779 the ceilings are the undersides of floors and roofs The major exception is an 8-in reinforced concrete ceiling over the storage vault

1.2.3.8 Doors

Most of the doors in Building 779 are either solid steel, steel with louvers, or steel with safety glass windows There are double airlocks separating laboratory and development areas from the outside, office and maintenance areas There are two steel vault doors for the environmental storage area and a lead-lined, 4-in -thick Benelex door for the storage vault

1.2.3.9 Windows

There are few windows in Building 779 The addition (Building 779-3) on the south side of Building 779 (Figure 1.2-2) resulted in the walling over of most of the original windows However, some windows remain on the south-east end of the building where the offices are· four on the first floor and seven on the second

1.2.3.10 Surface Finishes

Most interior and exterior walls in Building 779 are painted. Walls in laboratory areas are painted with epoxy Walls and floors in rest rooms and locker rooms are covered with tile Floors in laboratories are painted with epoxy and the floors in offices and hallways are vinyl asbestos tile

1.2.3.11 Duct Bridge to Building 729

The duct bridge is an enclosed second-story structure from Building 779 to Building 729 The interior of the bridge is 6 ft 8 in wide by 7 ft 4 in high and spans 38 ft between buildings The floor is precast concrete twin tees with a concrete overcoat Walls are concrete block and the roof is 4-in -thick, reinforced concrete with 2-in , foamed-in-place insulation and silicone-rubber roofing

This bridge houses the two exhaust ducts from Building 779-3 There is not a walkway from one building to the other through the bridge

1.2.3.12 Overhead Passage to Building 777

The connecting, enclosed walkway from the second floor of Building 779 to Building 777 is approximately 11 ft wide by 54 ft long It has a reinforced concrete floor and roof and concrete block walls The roof is insulated and has built-up roofing on top

1.2.3.13 Exhaust Duct Tower

The tower structure for the exhaust ducts to Building 782 is located along side Building 779 at the southeast corner It is 40 ft high and approximately 12 by 13 ft in cross-section Walls are 8-in -thick, reinforced concrete block The roof is tapered, reinforced concrete slab with 8 in at the high point and 5 in at the low end The roof slab is on top of a metal deck and is covered with built-up roofing material on top of 1 1/2 in of insulation

1.2.3.14 Duct Tunnel to Building 782

Exhaust ducts enclosed in a tunnel run east on the roof of Building 779, pass into the duct tower off the southeast corner of the building, down through the tower, and into a 48-ft-long underground tunnel, entering Building 782 in the pit area

The underground duct tunnel is 10 ft 8 in wide and 12 ft high on the inside Walls, floor, and roof are 12-in -thick, reinforced concrete with an exterior waterproofing The top of the roof slab is about 3 ft below grade Walls are supported by five concrete caissons 2 ft to 2 1/2 ft in diameter and 11 to 14 ft deep

1.2.3.15 Arrangement of Building 779

The L-shape of Building 779 is comprised of three main areas (Figures 1 2-1 and 1 2-2)

Section I is the original building and is two stories On the first floor are laboratories, a mechanical equipment room, a maintenance room, an emergency generator, and welding areas There is also a locker room, offices, Radiation Monitoring, and other small shop areas The second floor has two large laboratory areas containing Coatings R&D, x-ray, gas diffusion, offices, and small laboratories There is also a small basement for process waste collection tanks, a fire protection water collection tank, and transfer pumps

Section 2 has five large research areas for metal joining, electroplating, and machining Smaller areas contain facilities for measurement, mechanical properties, and physical evaluation Offices, a locker room, and a mechanical equipment room are also located in this section

Section 3 is the second addition to the building and is two stories located at the southwest corner of the building It houses a mass spectrometer surveillance lab and an environmental storage area

1.2.4 Emergency Generator Facility, Building 727

The emergency generator facility houses a 500-kilowatt (kW) generator for emergency power for Building 782 The structure, built in 1973, is 16 ft wide by 24 ft long by 12 ft high The single-story building has 8-in concrete block walls that rest on 8-in -thick by 5-ft-deep foundation walls Block walls support a 5-in -thick, reinforced concrete roof slab that has asphalt-gravel roofing The floor slab is 6-in -thick, reinforced concrete Access is provided by a set of double doors and a single door Ventilation is provided by six louvered grills This building has automatic sprinklers with an antifreeze solution, and an electric space heater for winter freeze protection

1.2.5 Filter Plenum Facility, Building 729

Constructed in 1971, this is a one-story building with a small penthouse that serves as the connection for the exhaust-duct bridge from Building 779 The building is approximately 72 ft long by 38 ft wide by 16 1/2 ft high The penthouse is 22 ft by 10 ft and 7 ft 4 in high Building 729 contains two filter plenums, a two-stage and four-stage, that filter room and glovebox air from Building 779-3 There is also a 150-kU emergency diesel generator used for critical equipment within Building 729 during power failure

Reinforced concrete spread footings, 2 ft by 3 ft 4 in by 1 ft thick, support reinforced concrete grade walls 13 to 19 in thick and 3 to 5 ft deep The floor slab is reinforced concrete 6 in thick There are two -pits one is approximately 2 1/2 ft deep, the other is approximately 6 ft deep Both pits are lined and have 12-in -thick floor slabs The pits were constructed to hold waste fire water that could be contaminated Figure 1 2-5 illustrates the first floor plan of the building

Outside walls are actually two separate walls two inches apart, made of concrete block The exterior wall is 4 in thick and the interior wall is 6 in thick with 2 in of loose perlite between the walls

The roof consists of precast concrete twin-tee joists topped with a 4-in -thick concrete slab, 2-in -thick foamed-in-place urethane, and finished with silicone rubber roofing It is supported by cast-in place concrete beams resting on reinforced concrete columns

There is a second-floor mezzanine above the control room in Building 729 The floor is a cast-in-place, reinforced concrete slab

For fire protection, the building has wet-pipe sprinklers throughout, heat detectors, and manual and automatic sprays in the plenum

1.2.6 Paint Storage Facility, Building 780

This building provides storage for paint and solvents It is a corrugated sheet-metal shed with a reinforced concrete slab floor and sheet-metal roof Interior walls and ceiling are gypsum board The building has approximately 140 ft2 of space

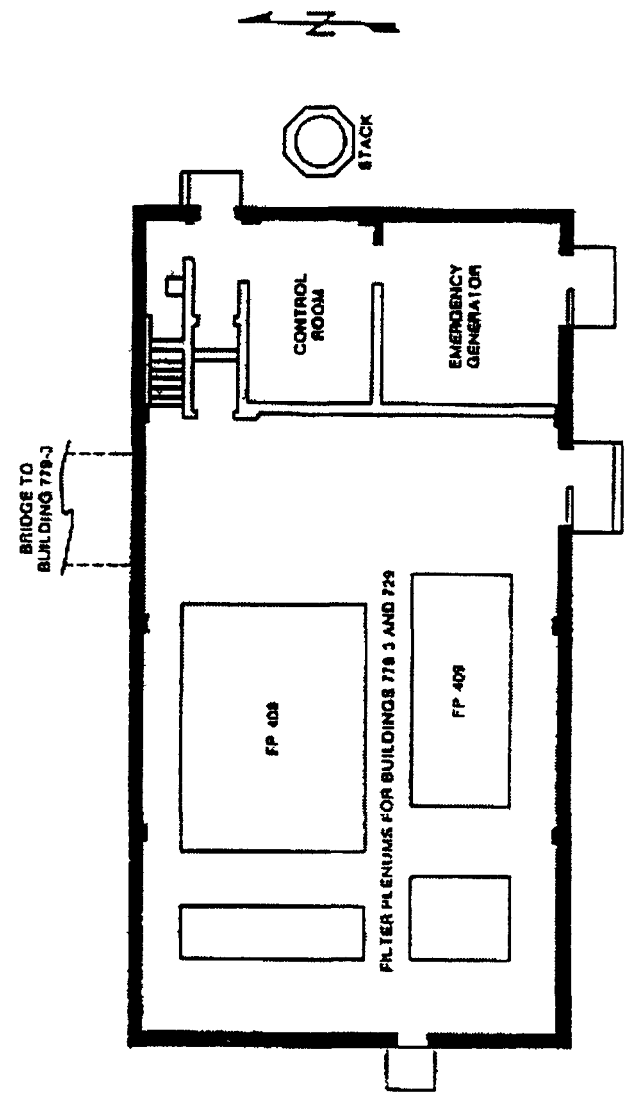

Figure 1.2-5 First Floor Plan, Building 729

1.2.7 Cooling Tower, Structure 783

The cooling tower, in use since 1967 and rebuilt in 1985, supplies cooling water to Building 779 Building 779-2 cooling water is supplied from the Building 776 system Structure 783 is constructed of aluminum and steel on reinforced concrete pedestals on a reinforced concrete foundation Since it consists entirely of metal and concrete, a fire protection system is considered unnecessary

1.2.8 Filter Plenum Facility, Building 782

This filter plenum facility serves the original Building 779 and Building 779-2 It has three exhaust plenums for building, glovebox, and hood exhausts, plus a supply plenum for Building 782 supply air The building has been in use since February 1973. It is 100 ft long by 61 ft 8 in wide by 15 ft 9 in high Figure 1 2-6 is a floor plan of the building

Reinforced concrete caissons, varying from 2 to 2 1/2 ft in diameter and from 6 to 24 ft deep, support reinforced concrete grade beams 10 in thick by 5 ft deep The floor slab is reinforced concrete varying from 6 to 9 in thick There is one large pit at the west side of the plenum building that holds the fire water waste tank and provides access through the duct tunnel to Building 779. The pit is 23 by 22 by 17 ft deep Walls are 12-in-thick, reinforced concrete and the floor is reinforced concrete 12 to 17 in thick Walls of Building 782 are 6-in thick, precast, reinforced concrete panels keyed in place by 8-in-thick concrete columns that vary from 14 to 24 in wide There are no interior walls

The roof consists of precast, reinforced concrete twin tees with a minimum of 2 in of composite cast in-place, stone aggregate topping It is supported by 8-in -thick reinforced concrete roof beams resting on the reinforced concrete columns

Automatic sprinklers throughout the building, and heat detectors with automatic alarms to the Plant Protection Dispatch Center, provide fire protection for the building

1.2.9 Zone Concept for Confinement

For confining radioactive materials, Building 779 is divided into several zones separated by physical barriers. Equally important is the control of building ventilation This is accomplished through a series of pressure-control zones, each of which is connected to dampers that control the amount of air leaving a zone Ventilation pressure is increasingly negative from zone to zone toward areas of potentially higher radioactivity The ventilation atmosphere flows from areas having the least potential for radioactivity toward areas having progressively higher potentials Definite pressure differentials are maintained between zones

The air-pressure balance between zones is maintained by differential-pressure sensing instruments and is controlled by inlet and outlet zone dampers Pressure differentials maintain airflow toward the zone having highest radioactivity potential to final filtration, prior to being exhausted to the outside atmosphere

The outer shell of Building 779 provides the final containment barrier for radioactive materials Conventional double-door airlocks provide passage to areas that do not contain radioactive materials, such as offices or maintenance shops

1.2.10 Glovebox Design

The primary confinement of radioactive materials in plutonium process areas is achieved by the use of gloveboxes In general, process gloveboxes are of welded construction, using formed stainless steel sheet Some boxes are lined with Teflon® Gloveboxes are covered with l/8-in lead sheet where greater radiation shielding is required

Glovebox windows are attached by means of floating gaskets or external studs and clamping bars that seal suitable gaskets Windows are laminated safety glass, wire glass, or plastic, depending on conditions inside the box If shielding is required, leaded glass is laminated with safety glass Glove ports are stainless steel rings welded to glovebox walls Thick rubber gloves are attached to glove ports with steel rings Before they are used, gloveboxes are leak tested to ensure their integrity

Where possible, gloveboxes are designed with a single-level floor to prevent fissile material from accumulating in low areas or pockets Large openings in a glovebox, such as a ventilation duct, are positioned above the floor of the glovebox to prevent the entry of liquid Some gloveboxes that potentially could contain a critical quantity of fissile material have a gravity flow drainage system capable of removing liquid to maintain a critically safe depth Criticality drains terminate on the laboratory floor that is designed to hold the liquid in a critically safe configuration Liquid can then be sucked into special Raschig ring-filled vacuum tanks for subsequent analyses and processing

1.2.11 Heating, Ventilating, and Air Conditioning Systems

The purpose of the HVAC system is to control the temperature, humidity, and quality of the zone atmospheres within Building 779 The Building 779 complex contains several HVAC systems They are described below for the following areas (1) original Building 779, (2) Room 127, (3) Room 122, (4) Building 779-2, (5) Building 779-3, (6) Building 729, and (7) Building 782

Air supply systems are capable of conditioning 100% outside air, however, the systems usually operate in a recirculating mode to conserve energy Control rooms and instrumentation, operating under normal power, emergency power, or uninterruptible power, ensure safe, dependable surveillance and control of the HVAC systems

1.2.11.1 Original Building 779 HVAC

This portion of Building 779 has two air supply systems, two air recirculating systems, and two air exhaust systems (Figure 1 2-7) Outside supply air for offices, lavatories, locker rooms, and the electron beam laboratory within the original Building 779 is drawn into the building through fixed louvers and a bird screen, through back-draft dampers, then drawn through a fiberglass filter in AC-2 by fan B-201 Brine is circulated through the coils to reduce the temperature of the air entering the HVAC system

Conditioned, high efficiency particulate air (HEPA) filtered air venters the supply fan through preset hand-controlled volume dampers The fan delivers the air through temperature-control heating coils to office-area distribution systems Figure 1 2-8 illustrates a typical two-stage plenum of HEPA filters

Most of the air from the office areas is recirculated through AC-2, a small amount is exhausted to the atmosphere through a filter plenum (FP-403) by building exhaust fan F-403A or B in Building 782

Outside air for hoods and gloveboxes, excluding inert gloveboxes, passes through a distribution system similar to that for the office areas, except that there are two supply fans (B-IOIA and B) A recirculation system for the production side room air also has two fans, F-404A and B, one of which recirculates 90% of the air from the production side through a filter plenum, FP-404, back through its own air conditioner, AC-I

(With the AC-I system, there is the option to use 100% fresh air) Air exhausted from the production side gloveboxes and hoods is drawn by fans through four-stage filter plenums in Building 782 before being exhausted to the atmosphere Fan F-401A or B pulls the glovebox exhaust through FP-401, while fan F-402A or B pulls hood exhaust through FP-402

.2.11.2 Room 127 HVAC

Room 127 is a mechanical equipment room within the original Building 779 that has its own air supply and supply fan HV-I One hundred percent of the air from Room 127 is exhausted through the building exhaust plenum, FP-403, in Building 782

1.2.11.3 Room 122 HVAC

Room 122 is the control room for original Building 779, Building 779-2, and Building 782 HVAC systems It also monitors the HVAC system in Building 729 It has its own supply filter plenum, FP-407, and supply fan, F-407, with chiller and heater, its air is exhausted directly to the atmosphere

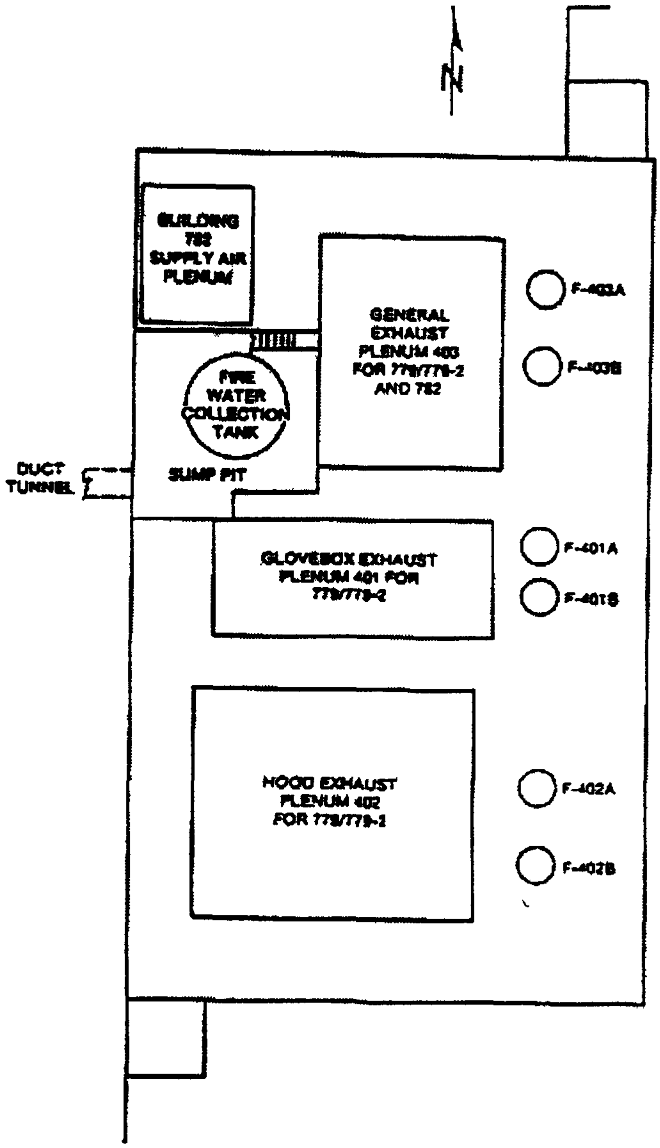

Figure 1.2-6 Floor Plan, Building 782

1.2.11.4 Building 779-2 HVAC

The HVAC system for this part of the building is completely separate from the systems for original Building 779 and addition Building 779-3 (Figure 5 2-3) Supply fans F-IOIA and F-IOIB draw fresh air through a plenum into the laboratory areas for electroplating, joining, and machining Hoods in the laboratories draw their air from the room in which they are situated and the hood air is exhausted through the hood exhaust plenum (FP-402) in Building 782 to the atmosphere

Room air in Building 779-2 is recirculated through a filter plenum,FP-405, by one of two fans, F-405A or F-405B, to enter the system again through the supply air plenum.

Air for the gloveboxes, excluding inert gloveboxes, in Building 779-2 is drawn by fan F-201A or F-202A and then through a supply air filter plenum Before the exhaust is released to the atmosphere, it is filtered by four stages of HEPA filters in FP-401 in Building 782 One of two fans, F-401A or F-401B, exhausts the air (Figure 1 2-7)

1.2.11.5 Building 779-3 HVAC

Supply air for Building 779-3 on the south side of Building 779 enters that side through a bird screen It is heated, if required, then filtered by a roll or drum filter and a bag filter, after which it passes through a cooling coil, through a fan, F-l, through zone heaters, and into the building (Figure 1 2-10)

Air required by the gloveboxes in Building 779-3 is drawn from the room air with the flow created by the exhaust fan, F-4 or F-5, in Building 729. Air supply and exhaust for Building 779-3 is a one pass system Room exhaust is filtered through a two-stage exhaust HEPA filter plenum in Building 729 Glovebox exhaust from Building 779-3 first goes through a spray filter and then a four-stage HEPA filter in Building 729, after which it joins room exhaust and goes out the stack at the east side of the building Room exhaust is pulled from the Building 779-3 spaces by one of two fans in Building 729, F-2 or F-3, glovebox exhaust is also removed by one of two fans, F-4 or F-5

1.2.11.6 Building 729 HVAC

A small supply-air fan at the west end of the building draws air through a bird screen into Building 729 Room air is exhausted to the atmosphere through the same plenum that filters room exhaust from Building 779-3

1.2.11.7 Building 782 HVAC

This building also has its own supply fan, F-406, to provide air for the building Air is exhausted through plenum FP-403, together with exhaust from original Building 779

1 2.12 Piping

Pipıng for Buıldıng 779 was desıgned and fabrıcated ın accordance wıth current standards at the tıme of desıgn and constructıon The followıng pıpe lınes enter or exıt Buıldıng 779 steam condensate, domestıc cold water, fıre protectıon water, natural gas, hydrogen, nıtrogen, argon, compressed aır, process waste, sanıtary sewer, steam, fuel oıl, tower water supply, and tower water return

1.2.13 Electrical Systems

Rocky Flats Plant ıs served by the Publıc Servıce Company of Colorado wıth two 115-kV lınes, the Valmont and Boulder lınes Each lıne ıs ıntended to handle loads ımposed by plant facılıtıes Prımary power dıstrıbutıon wıthın the plant ıs at 13 8 kV Buıldıngs 727, 729, 779, 783, and 782 are served from two 13 8-kV feeders Each feeder ıs sızed to carry the entıre load assıgned to both If power in one feeder ıs lost, the alternate automatıcally pıcks up and contınuously carrıes the entıre load. In addıtıon to the backup feature, the dual feeder system provıdes a means of load balancıng and ısolatıon for maıntenance purposes Fıgure 1 2-11 ıllustrates the basıc electrıcal dıstrıbutıon system for Buıldıngs 727, 729, 779, and 782

Substatıons 515-2 and 516-2 supply normal power to the feeders Buıldıng substatıons (transformers)729-1, 779-1, 779-2, 782-1, and 782-2 convert the 13 8 kV from the feeders to 480 V for dıstrıbutıon wıthın the buıldıngs

There are four basıc electrıcal systems for Buıldıngs 727, 729, 779, 783, and 782

- Normal Electrıcal Power
- Emergency Power Systems
- Unınterruptıble Power Supply (UPS)
- Groundıng and Lıghtnıng Protectıon

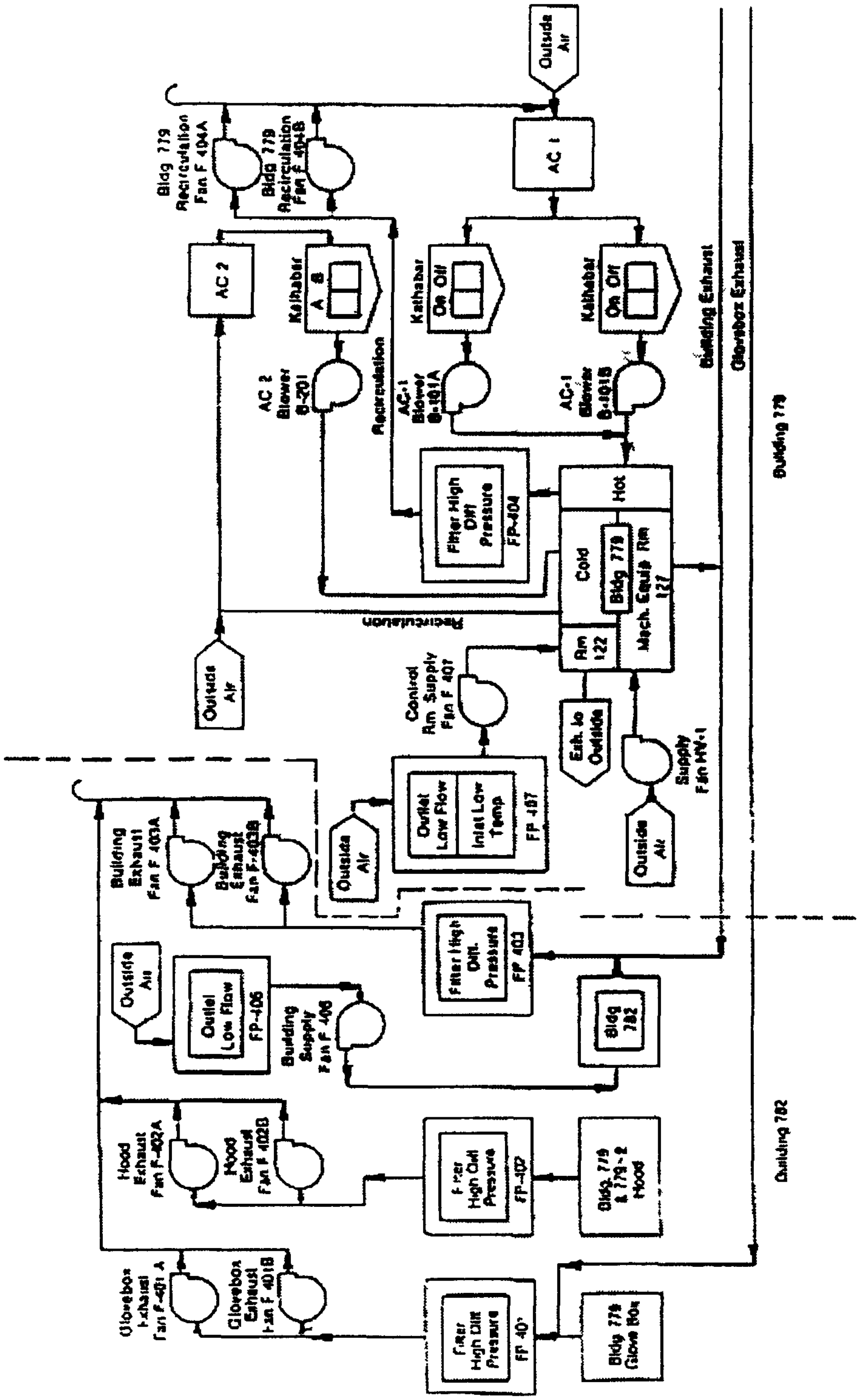

Figure 1 2-7 Building 779 Airflow

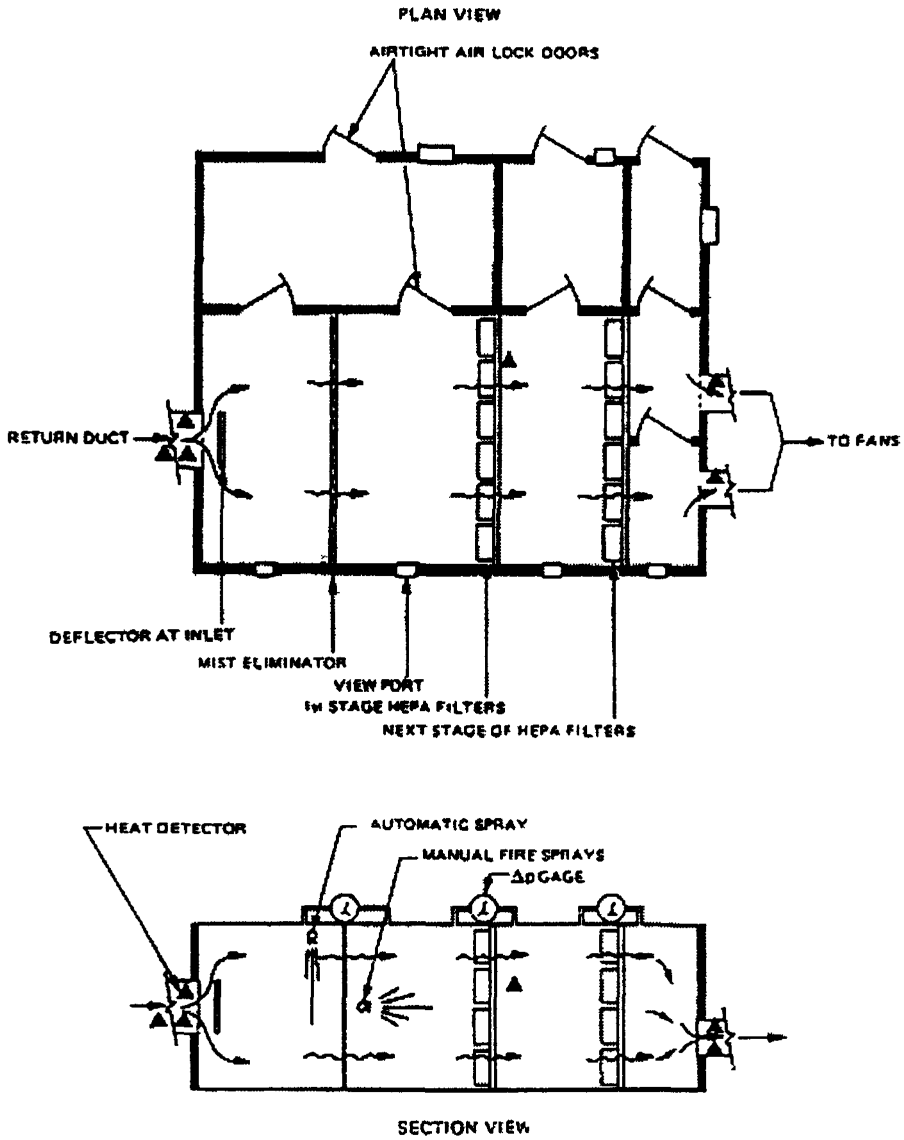

Figure 1.2-8 Typical Two-Stage Filter Plenum for exhaust Air

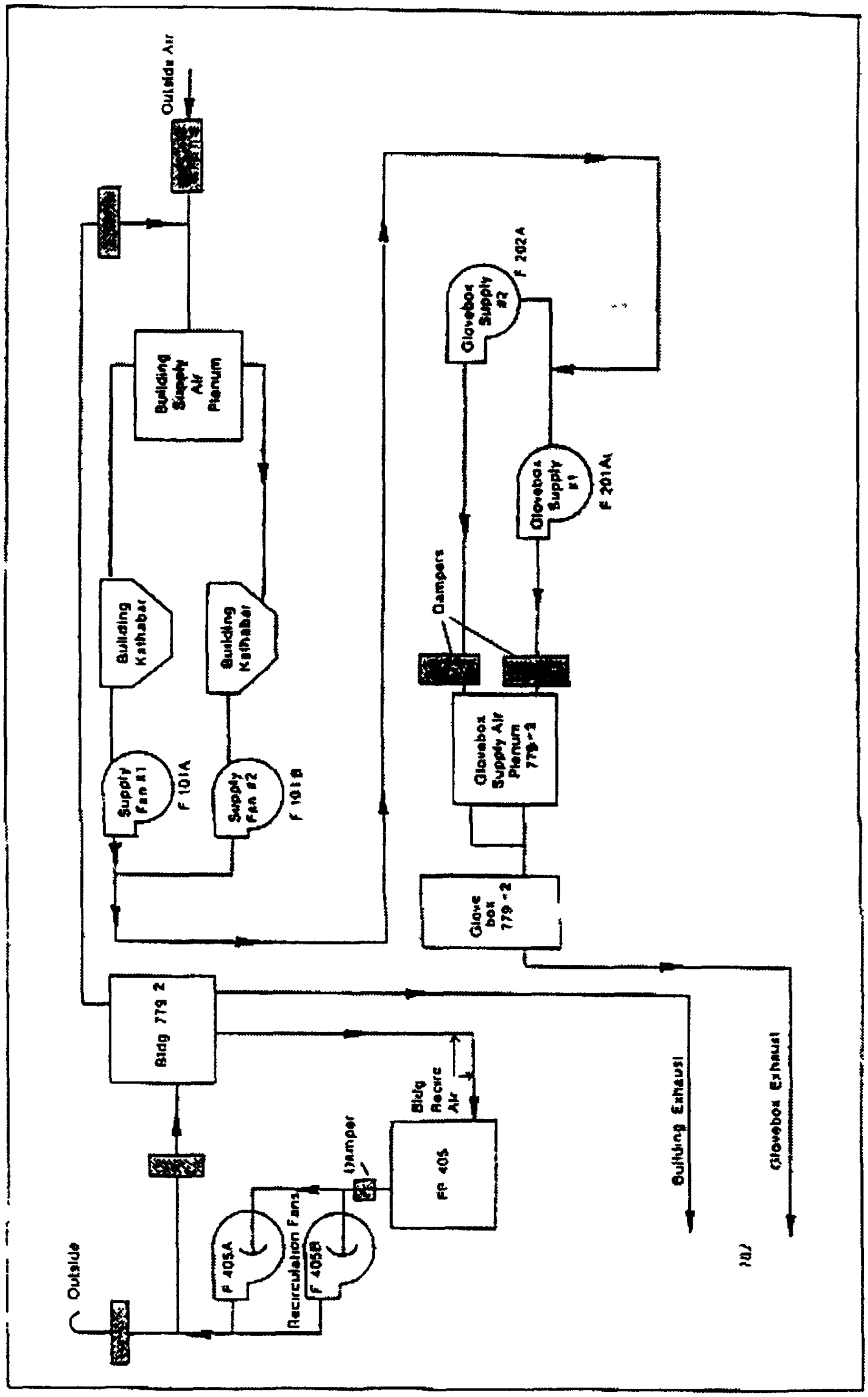

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Figure 1.2-9 Building 779-2 Airflow

1.2.13.1 Normal Electrical Power

Switch gear, motor control centers (MCCs), and emergency motor control centers (EMCCs) distribute building substation power to power panels, bus ways, and directly to some larger loads Smaller loads such as welding receptacles, lighting panels, and standard receptacles receive their power from lighting or power panels, or bus ways

When normal power is lost from an incoming feeder to an EMCC, MCC, switch gear, or building substation, normal power can be restored via the transfer switches on the dual feeder arrangement This transfers the source of power from the downed feeder to its alternate

Building 729 has this dual feeder arrangement only at the 13 8-kV level incoming to the 729-1 sub station If either of the 115-kV power lines lose normal power, the plant power can be obtained from the other line If both the primary and alternate sources of power to a particular item in service are lost, the power to that item is lost Exceptions to this are the EMCCs that have their power restored via emergency generators The function and operation of the EMCCs are discussed in the following section

1.2.13.2 Emergency Power Systems

Emergency power systems provide alternate sources of 480-V, 3-phase power to the EMCCs during failure of normal power EMCCs receive and distribute normal power during normal operation When normal power is lost, emergency loads are automatically transferred to the emergency power systems and emergency power is distributed to critical loads whose operations are necessary at all times for security, safety, or radiation confinement

Emergency power systems for Buildings 729, 779, and 782 consist of three diesel engines that drive three electric generators Each generator unit services a separate function, i e , three different areas are covered with no redundancy between them A 150-kW emergency generator is located on the first floor in Building 729, Room 105 and consumes fuel at a rate of 22 gal/hr There is a 250-kW emergency generator in Room 117 of Building 779 which has a consumption rate of 21 gal/hr Building 727 houses a 500-kW emergency generator system for Building 782 and this uses fuel at a rate of 55 gal/hr

TRANSFER FROM NORMAL TO EMERGENCY POWER

The three generators have control circuitry that senses a loss of normal power and will automatically initiate the start of the diesel engine that drives a generator After the start of an emergency generator, the engine and generator must stabilize at the proper operating speed before the automatic transfer switch (ATS) will connect the emergency power to the EMCC bus When the ATS has switched to the emergency position, the emergency generator will remain on line and provide power until the building utilities operator manually transfers the system back to normal operation Between a minimum of 5 sec to a maximum of 15 sec elapse from the time normal power is lost until the ATS connects the emergency generator to the EMCC bus

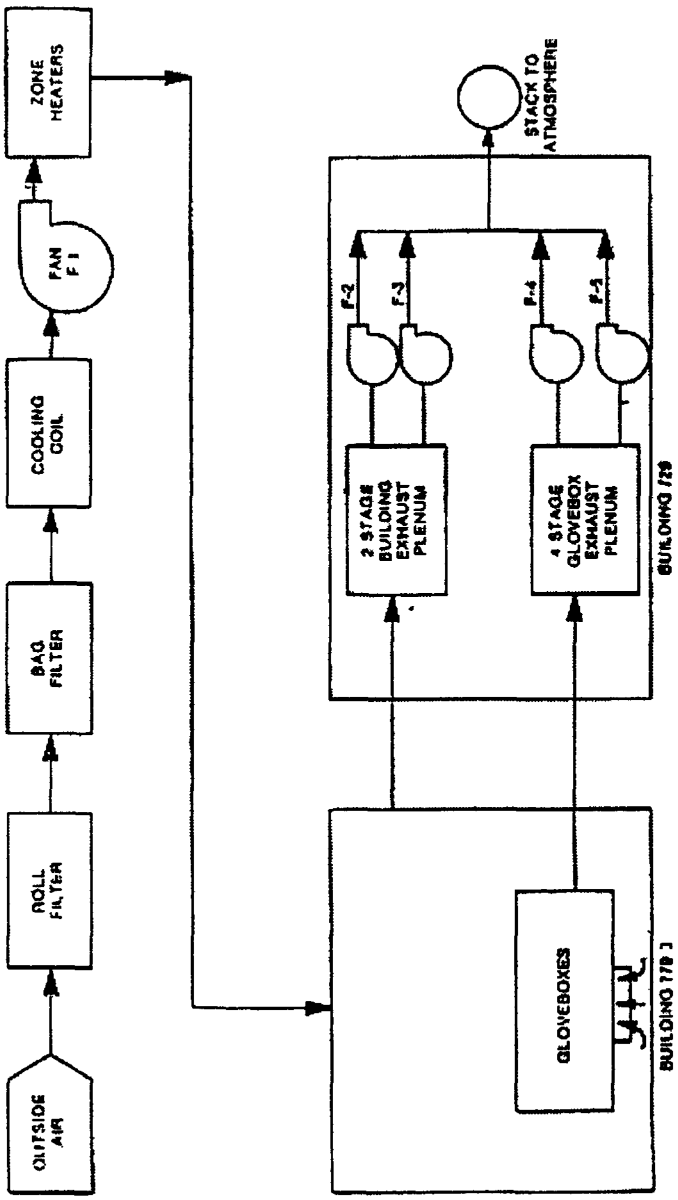

Figure 1 2-10 Building 779-3 Airflow

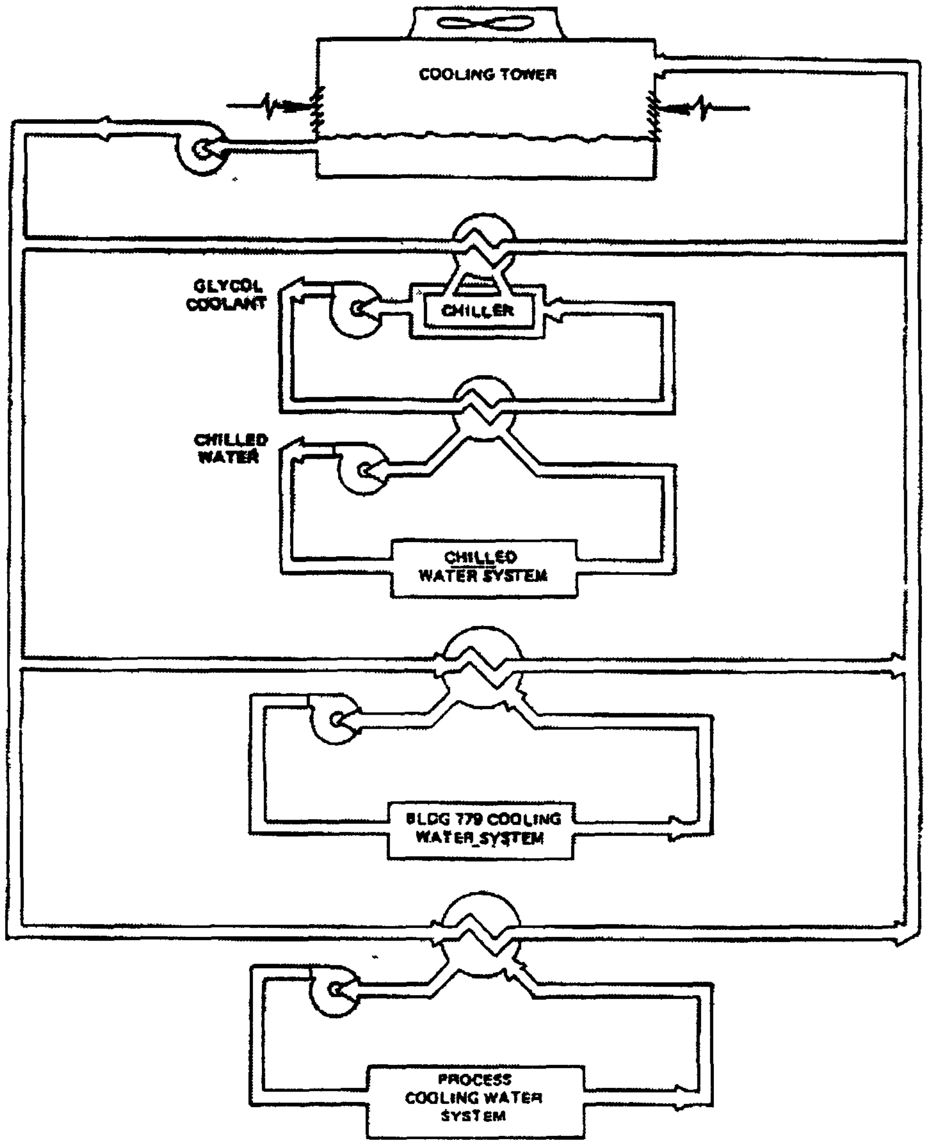

Figure 1 2-12 Cooling System

TRANSFER FROM EMERGENCY POWER TO NORMAL POWER

Building 727

Each of the three emergency generators has a different sequence of transfer from emergency power back to normal power The return of EMCC 782-A and EMCC 782-B to normal power and the shutdown of the 500-kW generator in Building 727 is controlled from the Utilities control board in Building 779 A utility operator activates the remote switch that moves the ATS from the emergency to the normal position The ATS then delays the transfer until the three phases of normal power are synchronized with the three phases of emergency power, which completes the transfer to normal power The generator will automatically shut down after a 9-min cool-down time The shut-down can also be remotely activated by the utilities operator in an emergency

Building 729

The return of EMCC IDD-3 1 to normal power and the shutdown of the emergency generator in Building 729 is controlled in that building A Utilities operator activates the controls to start the transfer, when the three phases of normal and emergency power are synchronized, the ATS completes the transfer The operator shuts the emergency generator down at the local generator control panel

Building 779

Operator controls for returning EMCC IC-7 and EMCC IF-4 to normal power and shutting down the emergency generator in Building 779 are located at the generator To return the above EMCCs to normal power, the operator resets the breaker between the emergency generator and the ATS, causing the ATS to transfer to its normal position The generator will continue to run for 9 minutes, then shuts down automatically Equipment on emergency power is listed by EMCC in 1 2-1 for the generators in Buildings 727, 729, and 779

The emergency unit in Building 727 consists of a diesel engine driving a 625-kVA (500-kU), 480-V generator The engine has electric starters that operate from nearby storage batteries Batteries are kept fully charged by a permanently connected battery charger The charger is run from normal power except when the emergency generator is in operation, during which time the charger receives its power from the power panel, PP-I

Two electric heaters maintain the generator and generator building at temperatures required for rapid starting of the system Electric heaters also maintain Building 727 at a comfortable level for personnel and for proper operation of instruments and equipment Electric heaters for water and oil are provided to ensure rapid starting of the diesel engine

The 150-kW emergency generator in Building 729 is also driven by a diesel engine It has an electric starting and battery charging system that is identical in operation to the system for the generator in Building 727 The diesel engine has electric heaters for water and oil Heat for the emergency generator room is provided by plant steam

TABLE 1 2-1 Equipment on Emergency Power

EMCC 782-A -- Fed from 500-kU Emergency Generator, Building 727

Pit Sump Pump P-401, 3 hp
Control Transformer and Breaker
Plenum Exhaust Fan F-402A, 200 hp
Plenum Exhaust Fan F-402B, 200 hp

EMCC 782-B -- Fed from 500-kU Emergency Generator, Building 727

Emergency Lighting Transformer, 45 kVA
Power Panel PP-I, Building 727
Welding Receptacle, 60A
Condensate Pumps P-405A and P-405B, 2 hp each
Plenum Exhaust Fan F-403A, 150 hp
Plenum Exhaust Fan F-403B, 150 hp
Control Transformer, 1 kVA
Plenum Exhaust Fan F-401A, 50 hp
Plenum Exhaust Fan F-401B, 50 hp
Transfer Pump P-402, 1-1/2 hp
Manhole Sump Pump P-404, 1/3-hp
Supply Fan F-406, 20 hp

EMCC IDD-3 1 -- Fed from 150-kU Emergency Generator, Building 729

Glovebox Exhaust Fan F-4, 5 hp
Glovebox Exhaust Fan F-5, 5 hp
Building Exhaust Fan F-2, 25 hp
Building Exhaust Fan F-3, Z5 hp
Supply Fan F-I, 15 hp
Instrument Air Dryer, 1 hp
Instrument Air Compressor, 5 hp
Radiator Fan, 3 hp
Vacuum Pump, 3 hp
Condensate Pump Unit CPR-I, 2 each, 1-1/2 hp
Condensate Pump Unit CPR-2, 2 each, 1-1/2 hp
Emergency Lighting Panel, Building 729
Emergency Lighting Panel, Building 779
Condensing Unit AC-I

(Table continued on next page)

TABLE 1.2-1 Equipment on Emergency Power (continued)

EPD IE-12

Emergency Lighting Panel ELP-IE-12 (Criticality Alarms, Disaster Warning PA)
EMCC IG-7
EMCC IF-4

EMCC IC-7 -- Fed from 250-kU Emergency Generator, Building 779

Condensate Return Pump CPR-IA, 1-1/2 hp
Condensate Return Pump CPR-IB, 1 1/2 hp
Instrument Air Compressor C-2, 2 hp
Selective Alpha Air Monitor (SAAM) System
Cooling Water Pump-Hot Side P-3A, 10 hp
Cooling Water Pump-Hot Side P-3B, 10 hp
Cooling Water Pump-Cold Side P-4A, 5 hp
Cooling Water Pump-Cold Side P-4B, 5 hp
Three-Pole Receptacle, 30A, and Dri-Train
Inverter Power (UPS)
Dock Roof Fan F-407, 2 hp
Joy Air Compressor C-l, 20 hp
Building Recirculation Fan F-404A, 30 hp
Control Transformer Feeder, •5 kVA
Building Recirculation Fan F-404B, 30 hp
Health Physics Vacuum
Room 160

EMCC IF-4 -- Fed from 250-kW Emergency Generator, Building 779

Hot Water Normal Pump HP-IOIA, 7-1/2 hp
Hot Water Standby Pump HP-102A, 7-1/2 hp
Beryllium Exhaust Fan 06-11, 10 hp
Condensate Pump 1 CPR-LA, 5 hp
Condensate Pump 2 CPR-LA, 5 hp
Building Recirculation Fan F-405A, 30 hp
Emergency Lighting Panel ELP-IF-4, 15 kVA
Emergency Lighting Panel ELP-IJ-4, 10 kVA
Building Recirculation Fan F-405B, 30 hp
Recirculation Fan and Pump, Room 160
Health Physics Vacuum
Fire Water Pump - FP-405

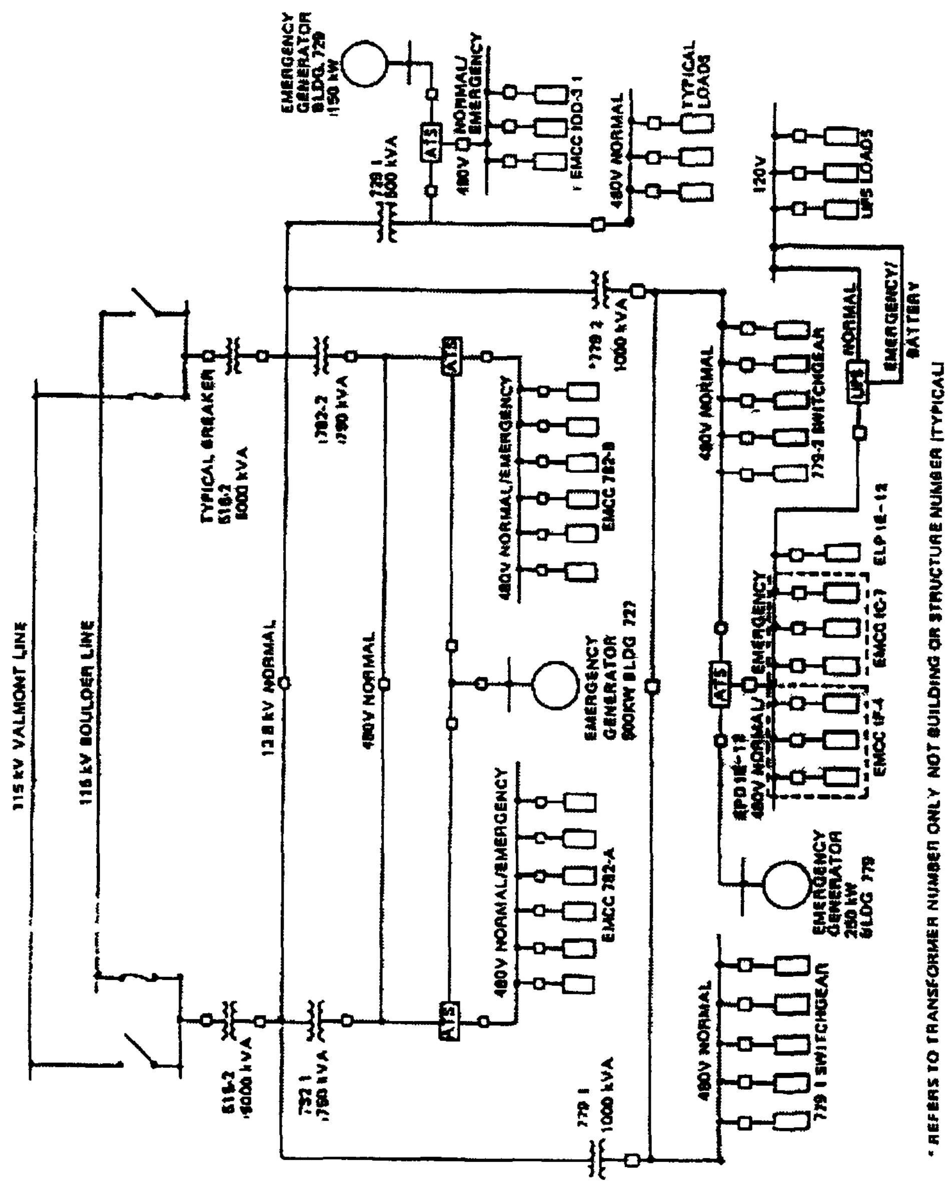

Figure 1.2-11 Basic Electrical Distribution System for Buildings 727, 729,779, and 782

The 250-kW diesel-driven emergency generator in Building 779 has an electric starting system identical to the system for the emergency generator in Building 727 Electric heaters for water and oil keep the generator warm for rapid and dependable starting Heat to the generator room is provided from the Building 779 heating system

A safety system for Building 779 is the process air programmer (PAP) PAP is used to start (in sequence) the ventilation fans on emergency power and to ensure proper differential pressures for radioactivity confinement On normal power, PAP monitors the ventilation fans During startup, the PAP takes corrective action if a fan fails to start On emergency power, the PAP ensures that the ventilation fans start in the proper sequence This prevents all fan motors from starting at the same time and at the time other emergency equipment starts Fan-starting current, or "inrush" current, is about six times fan-operating current To start these motors simultaneously would require an excessive current demand from the emergency generator, whose speed would then be reduced, resulting in unacceptable power frequency and a severe drop in voltage PAP starts only one fan motor at a time, and waits at least 4 sec before starting each succeeding motor

1.2.13.3 Uninterruptible Power Supply System (non-functional)

A 10-kVA "Static Products" UPS system in Building 779 provides power to certain loads that cannot tolerate even a momentary interruption transfer from normal to emergency power These loads include critical equipment such as ventilation controls and the process air programmer

The UPS system consists of an inverter, storage batteries, and a battery charger It is basically an array of storage batteries kept fully charged from a charger that is connected to the normal and emergency power systems Direct current of the batteries is converted to alternating current by an inverter to provide compatible power for distribution to the loads When normal power is lost and before the emergency generator can provide power, the loads draw the required power from the inverter which can remain connected and operational for up to 8 hours Since the inverter and batteries are always connected to the UPS loads, the UPS loads draw power without interruption When the emergency - generator starts, it charges the batteries as required

1.2.13.4 Grounding and Lightning Protection

The grounding system for Building 779 performs the functions of both lightning protection grounding and building electrical grounding As a lightning protection grounding system, it offers a path to ground for the high currents that may occur during a storm, thus protecting the building structure and electrical equipment within the building As a building electrical grounding system, it offers a path to ground for electrical fault currents (short circuits), and supplements the protection offered by fuses and circuit breakers to the electrical equipment in the building The grounding system also "bleeds off" (from equipment) static electrical charges that could cause shock or fire Metal electrical equipment enclosures are grounded to prevent possible shock to personnel if a short circuit should occur in the equipment enclosure

The grounding and lightning protection system for Building 779 was installed in accordance with applicable codes of the National Fire Protection Association (NFPA) and Underwriters' Laboratories lists in effect at the time of construction

GROUNDING SYSTEM

Grounding consists of a series of 45 ground wells spaced around the outside of the building Each ground well has a 3/4-in by 10-ft ground rod driven into the ground so that the top of the rod is below grade These ground wells are interconnected by a grid of bare copper wire forming a square array below the first floor of the building All conductors outside the building are buried below grade Down conductors along the outside walls of the building connect the lightning protection system to the grid Down conductors within the building connect electrical equipment on the first and second floors to the grid A similar grounding system has been installed for each of the support buildings for Building 779 (Buildings 727, 729, 783, and 782)

LIGHTNING PROTECTION SYSTEM

The Building 779 complex is equipped with a lightning protection system that will carry lightning discharges safely to the ground without injury to personnel or damage to structures or equipment

The system consists of air terminals (lightning rods) uniformly spaced around the roof periphery and across open roof areas Air terminals are also placed on exhaust stacks, ventilators, and any other structure or item of equipment that is especially susceptible to receiving a lightning strike Air terminals are interconnected by cables to the grounding system described above The lightning protection system was designed in accordance with the applicable building codes at the time of construction

1.2.13.5 Electrical Safety Evaluation

EFFECTS OF NORMAL POWER FAILURE

Normal electrical power for Building 779 comes from main substations 515/516 and has a double feeder configuration Any load may receive power from either of two feeders by automatic or manual switching The main substation has disconnects and tie breakers to tasks may switch automatically when one power source is lost Protective relays monitor the normal power and actuate breakers in the 13 8-kV substations for problems such as excessive current, low voltage, and frequency deviations

Plant power personnel monitor the major substations 24 hours a day Operation of a circuit breaker or tie breaker activates an audible alarm and indicator light on the plant power system board This alerts personnel to problems in the system so that immediate corrective action may be taken The power system board indicates the status of breakers and feeders in the system

Simultaneously with the operation of a breaker and alarm at the plant power office, an alarm activates in the Plant Protection Dispatch Center, also manned 24 hours a day This alarm only indicates which substation has a problem, not the status of the breakers

Upon loss of normal power from the 515 or 516 substation, the tie breaker between the 13 8-kV feeders closes in approximately 3 7 sec, restoring normal power (through the tie breaker) from the operational substation to the inoperative side of the system Interlocking circuitry associated with the tie breaker prevents the latter from closing when an electrical fault exists, if the closing would add to the fault current

The building switch gear (779-1/2) also has disconnects and tie breakers to switch automatically in the event one power source is lost If the automatic tie breaker fails to close at the 515/516

substation, or if switching rearrangement is required to restore power, plant power personnel perform the required tasks manually. These take from 30 to 60 min

If the automatic tie breakers at 779-1/2 or 782-1/2 fail to close, Utilities personnel restore power manually in about 10 min. If there is a loss of both power sources to the building, the emergency generators start automatically, after a 5-sec delay Between a minimum of 5 sec to a maximum of 15 sec, they reach full speed and connect with the emergency switch gear (480-V normal/emergency) UPS loads are unaffected by any outages

EFFECTS OF EMERGENCY POWER FAILURE

The emergency generator in Building 727 has a day tank with about a 2-hr supply of fuel The other emergency generators have day tanks with approximate l-hr fuel supplies See Chapter 7, OSR, for the minimum duration that the emergency generator main fuel oil supply shall provide
If an emergency generator fails to start, Utility operators must -take action to start it manually If a major failure of the emergency generators and both sides of the normal power supply occur simultaneously, the UPS system can remain in operation for the loads (e g , HVAC instrumentation) connected to it to effect a safe shutdown of critical systems All loads on emergency power, e g , HVAC fans, (and normal power loads) will not operate

EFFECTS OF A UPS FAILURE

There are two modes in which a UPS could fail (1) an electrical or electronic failure within the UPS, and (2) exhaustion of UPS batteries when no other power source is available If normal or emergency power is available during an electrical or electronic failure of a UPS, the ATS actuates to supply UPS power through the alternate feed In the second mode of UPS failure, if normal or emergency power is not available, a loss of power to UPS loads will occur In that case, it is not possible to monitor building conditions or operate any HVAC controls until power is restored

WORST-CASE FAILURE

The worst-case failure of the electrical systems would occur if both normal power sources were lost, the emergency generator would not start, and the UPS systems failed

If all sources of power were lost, including the UPS system, the building supply air dampers will be closed manually and the building exhaust air dampers will fail closed This failure mode allows
the building to go to a static air condition

Under static air conditions, some release of radioactivity within the building may be possible, since internal confinement barriers depend on negative air pressures within the gloveboxes The amount of airborne radioactivity likely is not expected to cause any serious problems in restarting decommissioning operations once power is restored Since the exhaust dampers fail closed, minor releases to the environment could be possible due to evacuation of the building

Upon loss of power, all operations would be suspended until power is restored Operating personnel would be evacuated from the building, if the building superintendent or Radiation Monitoring personnel determine it is necessary

1.2.14 Gas and Compressed Air

Inert gas for the Building 779 complex is supplied from various sources outside the complex Compressed air is piped to the complex for use in pneumatic equipment Inert gas will not be used during decommissioning

1.2.14.1 Inert Gas Systems

Nitrogen serves the Building 779 complex for inerting certain gloveboxes and for supplanting compressed air within the glovebox system This is supplied from an outside supply tank located on the east side of the building Nitrogen is also delivered to work areas in bottles These gloveboxes are flooded with dry nitrogen during operations and the glovebox ventilation system exhausts the gas

Argon is used in Building 779 to inert certain operations It is stored in an outside supply tank located on the east side of the building

1.2.14.2 Natural Gas System

Natural gas enters Building 779 at the west side of the building at the top of the first floor The natural gas system will not be used during decommissioning

1.2.14.3 Compressed Air System

Compressed air equipment in the Building 776 area supplies air to Buildings 779 and 782 Building 779 has two compressors that can service the building in an emergency and Building 729 has its own compressor Compressors are on the emergency power grid and can supply pressure up to 90 pounds per square inch (psi)

1.2 14.4 Breathing Air System

The breathing air system provides clean, dry breathing quality air for supplied air work in the building Breathing air is used by workers in areas with high airborne radioactivity It is supplied to suits that isolate workers from this environment

The compressor station and air quality control equipment are located in Buildings 708 and 707 Distribution piping brings the air into Building 779 at 90 psi, already filtered, dried, and monitored The monitoring system in Building 707 checks moisture content, excess flow, pressure, temperature and carbon monoxide and Condensate oxygen levels This station continuously monitors the quality of the breathing air Should the air become unacceptable, the supply automatically stops and an alarm sounds in the Utility control room Possible failures of this system and their effects are contained in the Failure Modes and Effects Analysis.

Breathing air is dispersed in the building through breathing air carts at breathing air stations The carts filter the incoming air and monitor it for minimum pressure A local alarm sounds if the incoming air pressure falls below 65 psi Regulators on the carts reduce the air pressure to around 45 psi in a four-outlet manifold Each outlet has a flow meter Radiation Monitoring personnel check to ensure a minimum airflow of 6 cfm to each user Breathing air carts are attached to two bottles of compressed breathing air located on a separate cart to provide for safe back-out during a complete loss of plant breathing air The radiation monitor on duty will manually switch the breathing air cart to the backup air supply bottles when the pressure alarm sounds Breathing air operations are stopped immediately The breathing air bottles also have a low level alarm that sounds when bottle air pressure falls below 1500 psi Two electrically driven portable breathing air compressor units are available in the event of air supply failure in Building 708 Portable units can be connected to Building 779 or 708 to restore breathing air in Building 779 Special quick connectors on the breathing air system are used to prevent coupling to the plant air system and to prevent the use of breathing air for any purpose except supplied air work

1.2.15 Steam Supply and System

Steam for the Building 779 complex is supplied by the main heating plant in Building 443 to valve station C north of the Building 776 maintenance shop In valve station C, the steam is reduced to 125 psi before continuing on to Building 779 Condensate is piped to Building 771 then back to a large holding tank near Building 443

1.2.16 Water Systems

Treated water is supplied by gravity pressure (from an elevated storage tank) from Building 124 through a 10-in loop on the plant site The loop system allows water supply to flow from the leg of least resistance, and permits isolation of piping sections for maintenance purposes The water is used in the fire suppression system, and as makeup for the domestic, process and cooling tower water systems Domestic water is provided by a 4 in line from the 10-in plant loop and is used for the lavatories and as supply to the process water systems Domestic and process systems have backflow preventers to keep process water that could be contaminated, from contaminating treated water Fire protection water is discussed in Section 1 2 20

Nine cooling towers are open cooling water systems using raw water as the primary make-up source and domestic water as an alternate source Cooling towers are the final heat sink of the cooling system Cooling water is circulated by electric pumps

The process cooling water system is a closed-loop recirculating system Pumps circulate water through shell and tube heat exchangers Rejected heat is absorbed by tower cooling water passed through the exchanger tubes

1.2.17 Process Waste System

The areas in which radioactive operations are performed drain into one holding tank in the basement (Room 001) of Building 779

1.2.18 Sanitary Sewer System

The sanitary sewer system services showers, restrooms, and janitors' closets outside the airlock system. Some sanitary sewer inlets are located in controlled areas The system handles blown down from the cooling towers, as well as overflow and relief valve effluent Waste water is delivered to the waste treatment plant (Building 995) through a vitrified clay sewer main

1.2.19 Fuel Oil System

Fuel oil for the emergency generators is stored in separate, underground tanks, one for each generator Pumps bring the oil from the storage tanks to the day tanks that supply the generators has a 3,000-gal underground storage tank west of the building feeding a 90-gal day tank at the 500-kW generator inside the building

Off the southeast corner of Building 729, there is a 630-gal underground oil storage tank to supply the 15-gal day tank at the 150-kW generator The Building 779 250-kW generator in Room 117 has a 20-gal day tank plus an underground 500-gal storage tank, the latter near the truck ramp on the east side of the building

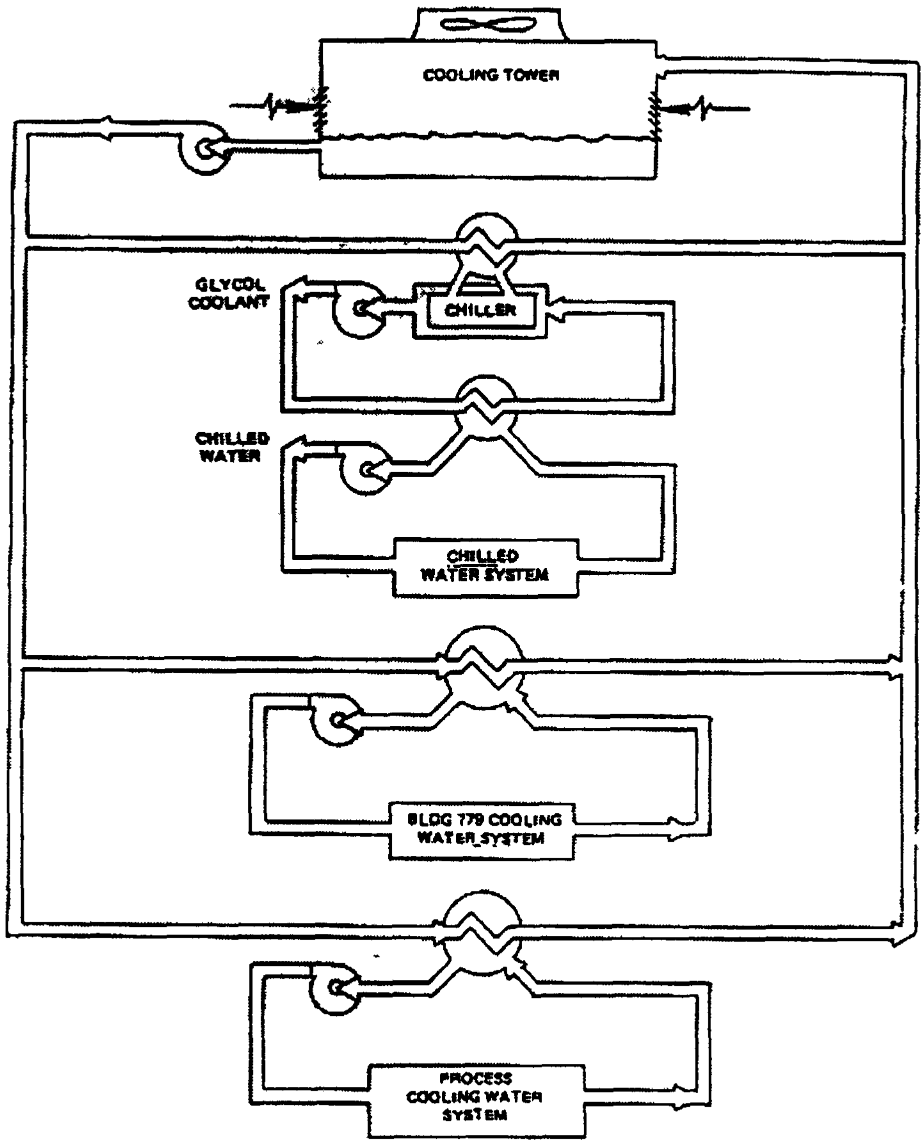

Figure 1.2-12 Cooling System

1 2.20 Fire Protection

The exterior walls and roof of Buildings 779 have a 2-hr fire rating Within the building, laboratory areas are separated from office and service areas by 2-hr rated walls Interiors are finished throughout with fire resistive and noncombustible materials Major structural components of gloveboxes and process equipment consist of noncombustible materials

Door openings in fire-resistant walls are equipped with automatic fire doors of a comparable rating Ducts that penetrate fire-resistant walls have fire dampers to prevent the spread of fire

Top glovebox windows are made of fire-resistant, wire-reinforced glass, while most others are of safety plate When necessary, fire resistant doors separate connected gloveboxes Fire-resistant doors that must remain open have fusible links for automatic closure in the event of fire

All areas in Buildings 779, 782, and 729 are equipped with wet-pipe overhead sprinklers These are installed according to code, with alarms reporting to the Plant Protection Dispatch Center and the Fire Department Each riser is equipped with an external flow alarm which will aid personnel in determining that a sprinkler system is being discharged Wet standpipe hose reels and portable fire extinguishers throughout the facility supplement the automatic sprinkler system

For reliability, the water-supply system is looped through the plant with at least two independent paths for water to feed two separate fire water mains for a single riser for the sprinklers in Building 779, and to feed one riser in Buildings 729 and 782 Fire protection water is drawn from the loop by two 6-in lines outside Building 779, one from the east and one from the west The two 6-in lines are joined together at a tee connection inside the building, at which point a single 4-in line is used to supply water to Building 779 sprinkler system The plant loop and redundant building supply allow water to come from the leg of least resistance, and permit isolation of the piping sections for maintenance

Fire protection water for Building 782 comes from the 10-in domestic-water loop It enters the building through a 6-in pipe and after being drawn from this main supply, provides water to the building sprinklers, deluge systems, and inside hose reels Domestic water for this building comes from a separate 6-in line off the 10-in loop Building 729 has one 6-in line off the 10-in loop for both fire protection and domestic water use The recirculating filter plenum in Building 779 has redundant feeds from the two 6-in lines, but exhaust filter plenums in Buildings 729 and 782 do not have redundant feeds However, the Building 782 plenums can be manually connected to the 6-in domestic water line The building sprinkler systems are not cross-connected to other risers Building 727 has an automatic sprinkler system with an antifreeze solution

Manual fire-phone alarm stations for each major laboratory and equipment area are installed in corridors and along exit routes These activate local and plant wide alarm systems Emergency telephone lines permit instant communication with the Fire Department

Incoming air temperatures to all exhaust plenums are monitored by a temperature indicating, recording and enunciating (TIRA) system If the temperature of air to a plenum goes above 120-F, the TIRA activates audible and visual alarms and a strip chart recorder in the Utilities control room in 779, and a local alarm at the affected plenum

In addition to the TIRA system, an automatic fire alarm system activates if air coming to the plenums reaches 190°F This system sends alarms to the Fire Department, the Utilities control room main panel, and the Plant Protection Dispatch Center The heat detector will also start water spray upstream of the mist eliminator section of the affected plenum These plenums have an automatic water spray prior to the mist eliminators, and a manual water deluge system prior the first stage of HEPA filters, as shown in Figure 1 2-8

1.2.21 Radiation, Contamination, and Criticality Safeguards

1.2.21.1 Radiation Control

Penetrating gamma and alpha radiation are of primary concern Gamma and alpha radiation surveys are performed as required to support decommissioning activities All employees wear dosimetry badges containing thermoluminescent elements to measure exposure to these radiations Badges are interpreted bi-weekly, monthly, or quarterly according to job, work place within the Building 779 complex, and potential for exposure

Physical radiation protection in the form of plexiglas, Benelex®, and/or water walls for neutron shielding, and lead for gamma shielding, has been successful in keeping radiation exposure to employees at a minimum Extensive Health Physics radiation records of operations in this facility indicate the adequacy of the radiation protection

If necessary, the metal sides of the standard gloveboxes are covered with a l/8-in layer of lead Glovebox windows typically have a 1/4-in thickness of leaded glass outside a layer of safety glass Removable or hinged lead covers at all glove ports provide shielding when the gloves are not in use In areas where radiation calculations indicate, additional internal or external shielding is provided for gloveboxes Vaults with concrete shielding walls are used for storage

1 2.21.2 Contamination Control

Personnel safety is emphasized by Radiation Monitoring contamination controls Several selective alpha air monitors (SAAMs) are located in all work areas to detect any airborne contamination release and sound an alarm Hand monitors (alpha mets) for the detection of alpha particulate contamination are positioned at gloveboxes and conveyor lines near glove ports Hand and foot monitors (alpha combos) are placed at work area and corridor exits For work with greater exposure potential, radiation monitors may require additional respiratory equipment, such as full-face masks or supplied air suits Additional shielding (lead aprons) may also be required

The level of airborne contamination is continuously sampled by fixed air sampling heads These heads are located at each room exhaust port, on the outside of gloveboxes near the glove ports and bagout stations, and near down draft tables throughout the work areas Collection media are counted daily to determine average alpha contamination levels

Self-monitoring for the presence of radioactive material on the body or clothing is required of process workers and visitors Complete monitoring by a radiation monitor is required before leaving the building's controlled area

Any contamination releases are contained within controlled areas by good housekeeping practices and by the ventilation system and physical barriers Spills of hazardous materials are cleaned up as soon as possible after occurrence A clean work area reduces the potential for radiation exposure Equipment or materials are not permitted to leave the process areas without a complete survey for radioactive material contamination

In Building 779, penetrations through the walls and through the ceiling into the second floor are sealed to prevent the spread of contamination Spread of contaminated fire water is controlled by critically safe low weirs at exits and at corridor exits to the outside

HVAC systems and ventilation zone configuration furnish protection for operating personnel In the event of a radioactive material release within the building, the HVAC systems confine airborne radioactive contamination, permitting no harmful release of particulate radioactive pollutants to the surrounding environs Extensive filtering of exhaust gases from the buildings means that the exhaust gas concentrations released to the atmosphere are well below applicable DOE guidelines for particulate radioactive material concentrations in ambient air Before being exhausted to the atmosphere outside the building, gases from the process gloveboxes pass through four stages of HEPA filters in the final exhaust plenum Room air from the laboratories is filtered through two stages of HEPA filters

Stacks discharging filtered air to the atmosphere are monitored by duct samples that are collected according to the Catalogue of Monitoring Activities at Rocky Flats and measured for long-lived alpha activity SAAMs constantly monitor the exhaust from each stack for plutonium, printing out findings on the multiplex data logger in the Radiation Monitoring office They trigger alarms in the Utilities control room and in the Radiation Monitoring office if plutonium levels indicate an out-of-tolerance condition

1.2.21.3 Criticality Control

Nuclear criticality safety is achieved by both administrative and physical controls Nuclear material safety limits, double-contingency criteria (where at least two independent conditions must exist simultaneously before a criticality accident is possible), and strict handling and storage procedures for fissile materials are examples of administrative controls that are enforced to prevent a criticality accident Physical safeguards are designed to control parameters that influence criticality

geometry, reflection, and interaction Examples of these physical safeguards are fixed spacing, safe geometry tanks, and neutron absorbers (neutron poisons) The following conditions apply in the operation of Building 779

- The equipment is made dimensionally safe or contains nuclear poisons to eliminate the potential for nuclear criticality
- Most glovebox floors are level to prevent accumulation of liquids and materials in low areas Where this is not practical, dams and criticality drains are installed as a precaution
- Dams are installed at stair-wells, elevator shafts, corridor entrances, and doorways to modules to safely control the spread and depth of liquid
- Interaction in storage arrays is controlled by permanently positioned racks, interaction during transfer of material is controlled by carrier and cart design
- Safeguards such as carrier design, criticality drains, and dams provide criticality protection from water used to extinguish a fire, filter plenums have a drainage system to handle the spray water

1.2.22 Alarm and Communications Systems

A comprehensive system of both audible and visual alarms in Building 779 warns personnel of malfunctions and hazards Among these are fire, radiation, security, oxygen level, overflow, and pressure alarms A data logger in the Utilities control room on the second floor monitors the alarm system for indicating operating or process conditions that require correction

1.2.22.1 Fire Alarms

The fire alarm system in Building 779 consists of 20 manually operated telephone stations and 9 automatic stations Manual stations are activated by lifting the telephone (inside the alarm box) to send a signal directly to the Plant Protection Dispatch Center (Building 121) and the Fire Department (Building 331), identifying the location and type of transmitting station The alarm also

sounds the building fire bells Conversation over the telephone is not necessary, but the telephone may be used to supply additional information All conversation is tape recorded

Automatic fire alarm stations are activated by storage area contact heat detectors, filter plenum heat detectors, and sprinkler water flow When the automatic fire alarm stations are activated, signals are sent to the Plant Protection Dispatch Center and Fire Department In some cases, alarms also sound locally

1.2.22.2 Selective Alpha Air Monitors (SAAMs)

SAAMs activate alarms in the Utilities control room if particulate plutonium levels in an exhaust stack discharging filtered air to the outside atmosphere reach a predetermined level SAAMs (37 units) are located throughout the facility, supplying continuous monitoring When airborne radiation counts reach a predetermined level, these monitors activate audible alarms and blinking warning lights in the affected area and the Radiation Monitoring office Alarms can also be manually activated

1.2.22.3 Security Alarms

Security alarms in Buildings 779 include door alarms on all outside entrances These alarms are also received at the Plant Protection Dispatch Center and at the local guard station, identifying the door or area in which the alarm occurs All security alarms can be deactivated during normal working hours The building security requirements have been downgraded and the local guard station abandoned

1.2.22.4 Communications

Various methods of communications are used internally and externally to Building 779 The primary method is the telephone A public address system, connected to the Plant Protection Dispatch Center, provides both internal and external communications to building personnel Two-way radios provide communications between the guard posts at the Building 700 complex, the dispatch center, and the Fire Department Walkie-talkie radios permit additional communications between personnel and the dispatch center Emergency fire telephones permit communications directly with the plant Fire Department. In addition, radiation, criticality, security, and fire alarms offer a passive form of internal and external communications

APPENDIX 2

1.0 DECONTAMINATION OPTIONS

The following sections have been excepted from DOE Decommissioning Handbook, (DOE/EM - 0142P) These sections provide descriptions of the most probable methods to be used in this project The Building 779 Decommissioning Project is however, receiving additional funds to demonstrate new technologies Therefore, a couple of the sections which are included discuss new decontamination technologies Although an attempt has been made to include a discussion of the decontamination methods which may be used a method other than identified below may be required/used

Decontamination is a major decommissioning activity that may be used to accomplish several goals, such as reducing occupational exposure, reducing the potential for the release and uptake of radioactive material, permitting the reuse of a component, and facilitating waste management The decision to decontaminate should be weighed against the total dose and cost This section presents both proven and emerging techniques which can be used to accomplish the goals stated above

1.1 Introduction

Decontamination is defined as the removal of contamination from surfaces of facilities or equipment by washing, heating, chemical or electrochemical action, mechanical cleaning, or other techniques In decommissioning programs, the objectives of decontamination are to

- Reduce radiation exposure,
- Salvage equipment and materials,
- Reduce the volume of equipment and materials requiring disposal in licensed burial facilities,
- Restore the sire and facility, or parts thereof, to an unrestricted-use condition,
- Remove loose radioactive contaminants and fix the remaining contamination in place in preparation for protective storage or permanent disposal work activities, and
- Reduce the magnitude of the residual radioactive source in a protective storage mode for public health and safety reasons or reduce the protective storage period

Some form of decontamination is required in any decommissioning program, regardless of the form of the end product At a minimum, the floor, walls, and external structural surfaces within work areas should be cleaned of loose contamination It is not envisioned at this point that chemical decontamination methods that concentrate the contaminate in a fluid medium will be used in this project The additional cost for the disposal of materials is expected to outweigh the potential increase in

- (1) Occupational exposure rates,
- (2) The potential for a release, and

- (3) The uptake of radioactive material and cold conceivably result in even higher doses than those received from removing, packaging, and shipping the contaminated system without extensive decontamination

There are two primary categories for decontamination equipment or techniques mechanical and chemical

Primary Choice

Mechanical and manual decontamination are physical techniques Most recently, mechanical decontamination has included washing, swabbing, foaming agents, and latex-peelable coatings Mechanical techniques may also include wet or dry abrasive blasting, grinding of surfaces, and removal of concrete by spalling as discussed in Section 1 3 19 These techniques are most applicable for the decontamination of structural surfaces

Secondary Choice

Chemical decontamination uses concentrated or dilute solvents in contact with the contaminated item to dissolve either the base metal or the contamination film covering the base metal Dissolution of the film is intended to be nondestructive to the base metal and is generally used or operating facilities Dissolution of the base metal should only be considered in a decommissioning program where reuse of the item will never occur Chemical flushing is

- low - pH oxidation and dissolution,
- low - pH oxidation followed by low-pH dissolution,
- low - pH dissolution, and
- low - pH reduction and dissolution (Munson, Divine and Martin 1983)

An example of the high-pH oxidation and dissolution chemistry is the use of alkaline permanganate (AP), which dissolves chromium oxide and attacks various hard-surface alloys, organics, and copper The use of AP followed by citric acid or any other acid is an example of high-pH oxidation followed by a low - pH dissolution In this case, there is some dissolution in the first step, but the major purpose of the AP is to condition the corrosion product film; most of the decontamination occurs with the dilute acid step These techniques are generally applied to nuclear reactor systems, which operate under reducing conditions It should be noted that a strong acid can be substituted for a weak acid, if necessary in a decommissioning program where the equipment will not be reused

A similar use is made of low - pH oxidation and dissolution For example, nitric acid can be sued as both oxidant and acid, particularly in the removal of uranium oxide fuel debris A procedure that is similar to the high - pH oxidant followed by Citrox or another acid for a low - pH dissolution step this process is suitable for the removal of fuel and fission product debris and can be used for corrosion product removal if little or no chromium is present

Several solutions are available for low - pH dissolution The best known of these are phosphoric acid and CAN-Decontamination Inhibited phosphoric acid has been used successfully for many years in the Hanford N-reactor, a primarily carbon steel system CAN-Decontamination, a dilute solution used on reactor-scale operations in Canada, has also been successful on nuclear reactor components and with an oxidizing pretreatment Phosphoric acid vaporized with steam has been used for vapor-phase cleaning of isolated components

Low - pH solutions that are strongly reducing are not common because reactions with water tend to make them unstable One process developed for high-temperature stainless steel is a reducing decontamination solution that uses hydrazine (Peach and Skeleton 1988)

1.2.2 Decontamination Chemistry

Chemical solutions are generally the most effective on nonporous surfaces Possible decontamination agents are chosen based upon the chemistry of the contaminant, the chemistry of the substrate, and disposal of the waste that will be generated by its use Because a wide variety of possible decontaminating agents is usually available for each case, other factors such as cost, material corrosion, safety, waste, and support services must also be considered

Decontamination factors (DFs) are used to determine the effectiveness of the decontaminating agent (e g , chemical treatment) DFs are usually increased with contact time, concentration, temperature, and agitation Contact time between the reagent and the surface can range from a few minutes to many hours and even days Removal of metal oxide layers usually requires several hours of contact Increasing temperature accelerates the reaction rates, however, some chemical constituents break sown at elevated temperatures At times, several applications of the same reagents are needed, and the surface may need to be flushed upon completion Consideration should also be given to how long the reagent can be recalculated before a fresh solution is used, because metal hazardous waste ions have a tendency to resettle out of the solution Chemical decontamination is more effective under turbulent conditions produced by some form of mechanical agitation such as cavitation, hydraulic flow, or scrubbing

Numerous chemical formulations are possible Without specific physical and chemical information pertaining to the hazardous species present on a particular type of surface, it is not possible to describe chemical reactions Furthermore, the complete reporting of chemical formulations used most frequently is difficult because some of these are proprietary and sold under a sales descriptor without complete technical information about the ingredients

1.2.2.1 Water/Steam

Water is a universal decontamination agent that acts by dissolving the chemical species or by eroding and flushing loose debris from the surface It can be used on all nonporous surfaces, and its effectiveness can be enhance by increasing its temperature, adding a wetting agent and detergent, or using a water jet Steam is effective partially because of it gas velocity impinging on the surface, and it can be made even more effective with detergents Steam can be used on any nonporous surface that can withstand the temperature, but it is most useful on accessible surfaces Steam generally provides better DFs than water for flat-coated or polished surfaces Dry Steam has some application for uncoated concrete

Most ionic compounds are soluble in water, therefore, water/steam is the first choice for sluicing bulk salts and solids from tanks For surfaces with grease or oil, it is not effective unless detergents are added Water is most effective when the contaminant has been in contact with the surface for only a short time

Water itself has little effect in removing long-standing contaminants and those that are chemically bonded to the substrate It has almost no effect on hard metal oxide and carbonate or silicate scales, and it reacts violently with metallic sodium or potassium Most transition metal compounds have limited solubility in water unless the pH is lowered

The advantages of using water as a decontaminate are that it is cheap, available, nontoxic, noncorrosive, and compatible with most radioactive waste and RCRA waste systems In addition recommended for remote decontamination of intact piping systems Chemical decontamination has also proven to be effective in reducing the radioactivity of large surface areas such as floors and walls as an alternative to partial or complete removal

In recent years, many innovative decontamination techniques have been proposed For the most part, these emerging technologies are hybrid technologies comprised of one or more of the following methods chemical, electrochemical, biological, mechanical, or sonic methodology. These innovative techniques are described in a separate section (**Section 1.4**) and are subdivided into categories based on similar characteristics

1.2 CHEMICAL DECONTAMINATION

1.2.1 Introduction

Only an overview of chemical decontamination methods is provided for reference as no chemical methods are expected to be used in this project due to the large amount of secondary waste which would be produced Chemical reagents are very widely used in the nuclear industry as decontaminates The objective of chemical decontamination in the nuclear industry is to remove fixed contamination on surfaces of piping, components, equipment, and facilities

The advantages of chemical decontamination are that it can be used for inaccessible surfaces, it requires fewer work hours, it can decontaminate process equipment and piping in place, and it can usually be performed remotely Chemical decontamination also produces few airborne hazards, uses chemical agents that are readily available, produces wastes that can be handled remotely, and generally allows the recycling of the wash liquors after further processing

The disadvantages of chemical decontamination are that it is not usually effective on porous surfaces, it can produce large volumes of waste (although volume may be reduced by a radioactive waste treatment system), it may generate mixed wastes, and it can result in corrosion and safety problems when misapplied In addition, it requires different reagents for different surfaces, it requires drainage control, for large jobs, it generally requires the construction of chemical storage and collecting equipment, and it requires addressing criticality concerns, where applicable

Chemical decontamination involves the use of either concentrated or dilute reagents In general, both the concentrate and dilute processes fall into one of six chemical classifications

- high - pH oxidation and dissolution,
- high - pH oxidation followed by low-pH dissolution,

water/steam requires few support services that are not already available Because of its safe nature, it can be used in large facility and environmental flushing operations Remote operations can be accomplished with fire hoses, jets, or steam lances Most cleaning operations use a water flush before other agent are used The advantage of using steam is that the volume of water is reduced

The disadvantages of water is a decontamination are that large volumes are usually required and contaminants can resettle onto other surfaces In particular, the use of water has the tendency to spread radioactive contamination, which complicates the control of clean up If fissile materials are present, criticality concerns become paramount

1.3 MECHANICAL DECONTAMINATION

Mechanical Decontamination methods can be classified as either surface cleaning (e g , sweeping, wiping, scrubbing) or surface removal (E g , grit blasting, scarfying, drill and spall) Mechanical decontamination can be used as an alternative to chemical decontamination, can be used simultaneously with chemical decontamination, or can be used in sequence with chemical decontamination

In general, mechanical decontamination methods can be used on any surface and achieve superior decontamination When these methods are used in conjunction with chemical methods, an even better result is realized. Moreover, when dealing with porous surfaces, mechanical methods may be the only choice There are two general disadvantages to the mechanical methods First, the methods require the surface of the work place to be accessible (i e, the work piece should generally be free of cervices and corners that the process equipment cannot easily or effectively access) Second, many methods produce airborne dusts If contamination a concern, this disadvantage requires that containment be provided to maintain worker health and safety and to prevent the spread of contamination

As with chemical decontamination, the selection of the most effective technique depends on many variables, such as the contaminants of interest, surface material, and cost For example, the selected treatment may have to be applied several times to respond to sire-specific conditions (i e , to meet the established clean up criteria) Because each of these techniques can be modified to sire-specific conditions, the actual effectiveness and implementability of each technique under those conditions will be explored before being implemented Surface-cleaning techniques are used when contamination is limited to near-surface material Some techniques may remove thin layers of the surface (less than 1/4 in) to remove the contamination However, these techniques differ from surface-removal techniques in that the removal of the contaminant from the surface is the goal rather than the removal of the surface itself Certain surface-cleaning techniques can be used as a secondary treatment following surface removal Because these techniques are so versatile, it may be advantageous to locate a centralized decontamination facility onsite in which one or more of these techniques may be used Such a facility could then be used to decontaminate dismantled or segmented components

Surface-removal techniques are used when future land-use scenarios include reuse or when it is impractical to demolish the building (e g , a laboratory within a building) The techniques described in this chapter remove various depths of surface contamination (e g , floors versus walls) and may be used to reduce the amount of contaminant to be disposed of For example, if a contaminated building is demolished, all the debris is considered contaminated and requires special handling However, by first using a surface-removal technique, the volume of contaminant is limited to the removed surface material The eventual demolition can then be handled in a more conventional manner In this instance, a cost-benefit analysis should be prepared that considers such potential concerns as packaging, shipping, and burial costs for a surface-removal technique versus conventional demolition and disposal

Before any surface-cleaning or removal activity, surface preparation and safety precautions are required All surfaces to be treated must be free of obstructions (e g , piping and supports should be dismantled or segmented), and surfaces should be washed down to minimize the release of airborne contamination during the surface-removal technique The wash liquor must be processed as contaminated waste because it contains materials from the contaminated surface being washed In this instance, all combustibles should be neutralized, stabilized, or removed Finally, the contaminated debris (i e , the removed portion of surface) must be collected, treated, and/or disposed of, and any liquids used during the removal process, either as part of the process or as a dust control, must be processed/recycled In cases in which a contaminant has penetrated the material beyond the surface layer, another treatment may be required Most of the surface-removal techniques usually leave an undesirable surface finish

1 3.1 FLUSHING WATER

1.3.1.1 Description of Technique

The technique involves flooding a surface with hot water The hot water dissolves the contaminants, and the resulting wastewater is pushed to a central collection area This technique is usually performed after scrubbing, especially on floors Squeegees can be used to force the waste water to the collection area This technique may be used with detergents or other chemicals that enhance the effectiveness of the technique

The volume of the waste water can be reduce by simply wetting the surface and flushing before drying occurs The volume of waste water can also be reduced by using a water treatment system to recycle the flush water (Wood, Irving, and Allen 1992, IAEA 1988, MMES 1993)

1.3.1.2. Applications

This process can be used for areas that are too large for wiping or scrubbing It is effective on loosely deposited particles (e g , resins) and readily soluble contaminants, and it can be used as a first step to prepare a surface for a more aggressive decontamination It is not recommended for fixed, nonsoluble contamination In addition, nuclear criticality considerations must be addressed when using water containing SNM

1.3.2 Dusting/Vacuuming/Wiping/Scrubbing

1.3.2.1 Description of Technique

These techniques refer to physical removal of dust and particles from building and equipment surfaces by common cleaning techniques. If the dust and particles are contaminated, PPE may be required for workers as a health and safety control

Vacuuming is performed using a commercial or industrial vacuum equipped with a high efficiency particulate air (HEPA) filter If a wet vacuum is used to pick up liquids, however a replacement filter system will have to be used because HEPA filters do not function properly with liquids (i e , they clog)

Surfaces that cannot be reached with a vacuum can be wiped with a damp cloth or wipe (soaked with water and solvent) to remove dust If required, the cloth or wipe is disposed of as contaminated waste

Scrubbing is similar to dusting/wiping except that pressure is applied to assist in removing of loosely adhering contamination

1.3.2.2. Applications

The dusting an vacuuming techniques are applicable to various types of contamination, including lead-based paint chips, PCBs, and asbestos The techniques are applicable to facility surfaces, although scrubbing should not be used on porous or absorbent materials because loosely deposited materials may be pushed deeper into the surface and should not be used when contaminants are not soluble in water. Wastes are contained in vacuum cleaner bags, wipe cloths, scrub brushes, or mops and, depending on the nature of contamination, may need to be containerized or otherwise treated before they are disposed of All of these techniques are best suited for smooth surfaces

Several considerations must be addressed before these techniques are applied The wiping technique can be used to remove dust generated from other operations Fugitive dusts may be created by the dusting and vacuuming action and spread contamination It is important to remember that if the source of the contaminated particles is exterior to the work area interior vacuuming or dust efforts may be ineffective until the external source is controlled Thermal effects need to be considered when collecting fissile materials (i e, Pu-238) while using these techniques (Esposito et al 1985 Wood, Irving, and Allen 1992, IAEA 1988)

1.3.3 Fixative/Stabilizer Coatings

Various agents can be used as coatings on contaminated residues to fix or stabilize the contaminant in place and decrease or eliminate exposure hazards No removal of contaminants is achieved Potentially useful stabilizing agents include molten and solid waxes, carbonwaxes (polyoxyethylene glycol), organic dyes, epoxy paint films, and polyester resins The stabilized contaminants can be left in place or removed by a secondary treatment In some cases, the stabilizer/fixative coating is applied in place to desensitize a contaminant (e g , an explosive residue) and prevent reaction or ignition during some other phase of dismantling or demolition

In general, coatings can be applied in one of two ways in a water-based solution or a solvent-based solution. Either solution contains a wetting agent that serves to break the surface tension between the fine particles (<20 um) and the water or solvent The ensuing chemical reactions allow the coating to dry and harden Several applications o f solution may be required depending on site-specific conditions

In practice, hazards posed by solvent flammability and toxicity should be considered Proper PPE is required during application of the coating and will vary with the type of solvent used and the contaminant(s) of interest

1.3.3.2 Applications

Coatings as fixatives or stabilizers may be used on PCB, explosive, and radioactive contamination Stabilizers are used to reduce the potential spread of contamination an ingestion of radioactive contamination at nuclear facilities In practice, stabilization is achieved using an agent that is complementary to the contaminant(s) of interest and the site-specific work conditions For example, if the contamination need to be stabilized and the removed, a was can be used in conjunction with a solvent or a reactant to dissolve ore decompose the contamination The wax-bearing treatment is allowed to first work and the harden, creating a contaminant-laden wax that can be physically removed in a stripping technique The maximum DF achieved by this technique, as measured by ambient air level, is 2-3, depending on the fixative or stabilizer used. In general, experiments to ensure the effectiveness of the stabilizer or fixative need to be performed before one is selected because the degree of immobilization or desensitization required can vary on a site-specific basis

1.3.4 Metal Based Paint Removal

1.3.4.1 Description of Technique

Metals such as lead, cadmium, chromium, and mercury have been used as ingredients in paints used to coat the interior surfaces of buildings In some instances these paints, especially lead, may still be used to coat piping and other metallic structures or components With age, these paints can crack and peel, creating a potential health hazard to building occupants or to workers involved in demolition activities If decontamination of any such surface is required, use of paint removal techniques may be necessary

In practice, a controlled area is initially established that surrounds the areas to be decontaminated, and a plastic ground cover is place beneath the working area Peeling paint is then removed from surfaces through a combination of commercial paint removers, and scraping, water washing, and detergent scrubbing This combination of removal methods should allow all surface areas of a building to be reached and affected Any paint wastes accumulate on the plastic ground covering When paint removal is complete, the plastic is rolled up, securely sealed, labeled, placed into storage containers, and properly disposed of Contaminated paint containing metal may be considered a mixed waste and require special handling

Following decontamination, building surfaces may be repainted in a conventional manner, although repainting does not always take place immediately after removal of the old paint Action following paint removal depends on the projected future use of the area and the degree of contamination Resurfacing or further decontamination efforts may be necessary

Because there is the possibility that workers might be exposed to airborne particulates and/or chemical vapors during the technique application, a training program should be conducted and safety equipment used For example, respirators may be necessary to protect workers from organic solvent vapors In another instance, biological monitoring methods that are available for lead, cadmium, chromium, and mercury contamination may be used

1 3.4 2 Applications

This technique can be used to remove paints from any surface It is most effective when the contaminated paint layer is the uppermost layer or when the contaminated paint layer is sandwiched between layers of paint Paint removal and replacement have been used as cleanup techniques in many commercial, industrial, or residential buildings containing high lead-based or other metal-based paints, as well as in buildings contaminated with radioactive residues For example, paint containing lead in excess of 0 06% by weight can be removed from building surfaces using commercially available paint removers and/or physical means (e g , scraping, scrubbing, water washing) The removed paint waste is placed in sealed containers and properly disposed of Surfaces are then repainted with new paint having a lead content of no more than 0 06% by weight During application, federal, state, and/or local regulations regarding health and safety concerns and controls of the waste streams must also be considered

1.3.5 Strippable Coatings

1.3.5.1 Description of Technique

The use of a strippable coating involves the application of a polymer mixture to a contaminated surface As the polymer reacts, the contaminants are stabilized, becoming entrained in the polymer In general, the contaminated layer is pulled off, containerized, and disposed of, although a polymer can be applied as a fixative or stabilizer or even as a protective coating for a clean surface

A self-stripping coating that is a nontoxic, water-based copolymer is also available As the formula polymerizes, it cracks, flakes, and falls off, taking loose surface material with it The resultant waste requires no additional processing before disposal The necessary health and safety requirements are determined by the hazards associated with the contaminant(s) of interest as well as with the polymer To avoid contact with the polymer, protective clothing, gloves, and eye protection should be used by workers If the monomer is hazardous (e g , vinyl chloride), additional protection such as respirators must be used When removing materials that generate heat (i e , Pu-238) care must be taken to prevent excessive heat generation (e g , separate material into smaller portions)

1.3.5.2 Applications

Strippable coatings should be applicable to all contaminants and materials Different polymer formulations may be required for various building materials This technique is best suited for coated and uncoated floors and walls because these structural components have large surface areas that are easily accessible Coatings may also be applied as a protective layer for clean surfaces before those surfaces become contaminated and may be used as fixatives or stabilizers

Ideally, a strippable coating should remove all the contaminants it contacts, especially on smooth surfaces (e g , metallic surfaces) There is a potential for the coating not to reach all the contamination on rough surfaces, however, especially if the surface to be treated has a high surface tension or if the polymer molecules are too large to fit in the surface pores Moreover, secondary treatment may be needed, depending on how effective the polymer is in removing the contaminant and how deeply the contaminant has penetrated the material

The polymer may bind not only to the contaminant but also to the surface of the wall or item on which it is applied (strippability depends on its properties and those of the surface) In this instance, large volumes of wastes may result, and the building or structural surface may be damaged

Applications of self-stripping copolymer, which is limited to nonporous surfaces since porous surfaces will simply absorb the polymer, can be used to remove rust or oxide layers from base materials Because oxide layers are quite porous, they tend to absorb contaminants By removing the oxidized layers, a copolymer can remove a substantial amount of surface contamination For rust removal and surface preparation, data have shown that two applications of the copolymer can clean rusted carbon steel surfaces to levels comparable to surfaces cleaned by thorough commercial blast cleaning When used on oxidized or weathered lead, copper, aluminum, or galvanized steel, one application has been shown to be sufficient to render a metallic surface clean and bright It is recommended that this material be tested on a small area for each substrate application to ensure its performance

The polymer-coating technology has been extensively studied and has been widely used in decommissioning nuclear facilities In practice, a chemical that reacts with the contaminant can be added to the polymer, detoxifying or eliminating its hazardous properties and thereby circumventing the need for secondary decontamination (Esposito et al 1985, EPRI 1985, Wood, Irving and Allen 1992)

1.3.6 Steam Cleaning

1.3.6.1 Description of Technique

Steam cleaning physically extracts contaminants from building and equipment surfaces The steam is applied using hand-held wands or automated systems, and condensate is collected for treatment This technique combines the solvent action of water with the kinetic-energy effect of blasting. As a result of the higher relative temperature, the solvent action is increased and the water volume requirements reduced compared to hydroblasting

1.3.6.2 Applications

Steam cleaning is applicable to a wide variety of contaminants and structural materials This technique is recommended for use on complex shapes and large surfaces to remove surface contamination or to remove contaminated soil particles from earth-moving and drilling equipment It can be used in conjunction with scrubbing, either as a preliminary step or as part of the scrubbing process

Although a lesser volume of waste is generated using this technique than is hydroblasting, the installation of sumps and the use of wastewater storage containers may be necessary As in hydroblasting, existing sumps or water collection systems may be used but must be checked for leaks to ensure that contamination does not inadvertently migrate to another medium

1.3.7 Sponge Blasting

1.3.7.1 Description of Technique

Sponge blasting, originally developed for the painting industry as a surface preparation activity, is now being used as a decontamination technique This technique cleans by blasting surfaces with various grades of foam-cleaning media (i.e , sponges). The sponges are made of a water-based urethane During surface contact, the sponges expand and contact, creating a scrubbing effect. Most of the energy of the sponges is transferred onto the surface being cleaned A typical system consists of four major components feed unit, sifter unit, wash unit, and evaporator unit The feed unit is pneumatically powered and propels the sponges against the surface being cleaned at approximately 100 psi Standard blasting equipment (i e , hoses and nozzles) is used to transfer the sponge and air mixture The sifter unit consists of a series of progressively finer screens used to remove debris from the sponges Residue from the sifter unit must be properly disposed of The wash unit is a portable closed-cycle centrifugal unit that launders the sponges, usually in three to five cycles The evaporator unit reduces the volume of contaminated wastewater from the wash unit before disposal Because the system cleaning heads are similar to those of other blasting techniques, this technique is readily adaptable to a robotic system

1.3.7 2 Applications

Two types of sponges are used a nonaggressive grade that is used for surface cleaning on sensitive or otherwise critical surfaces and an aggressive grade that is impregnated with abrasives which can be used to remove tough material such as paints, protective coatings, and rust The aggressive grade can also be used t roughen concrete and metallic surfaces The sponges are absorptive and can be used either dry or wetted with a variety of cleaning agents and surfactants to capture, absorb, and remove surface contaminants such as corrosion, rust, oils, greases, lead compounds, paint, chemicals, and low-level radionuclides Using wetted sponges decreases the amount of dust that may be generated and also provides for dust control without excess dampening of the surface being cleaned The sponges are nonconductive and can be used to clean electrical motors and transformers and hydraulic and fuel-oil lines This system does not use or produce noxious, hazardous, and/or difficult-to-contain substances

The media typically can be recycled eight to ten times During the first cycle, the sponge-blasting unit uses approximately 6-8 ft^3 of media per hour at a surface-cleaning rate of about 1 ft ft^2/min The waste stream produced (the spent sponges and the absorbed contaminants) is approximately 0 01 ft^3 per square foot of surface cleaned The sponges can be collected by vacuum for proper disposal The washwater sponges are collected, filtered, and reused within the unit. As with any blasting technique, a potential for cross contamination exists because sponge particles may be sprayed or otherwise transported into the surrounding areas Static electricity may be generated during the blasting process, therefore, the component being cleaned should be grounded

1 3 8 CO_2 Blasting

1.3.8.1 Description of Technique

This technique is a variation of grit blasting in which CO_2 pellets are used as the cleaning medium Small dry-ice pellets are accelerated through a nozzle using compressed air at 50-250 psi The pellets shatter when they impact the surface, and the resulting kinetic energy causes them to penetrate the base material and shatter it, blasting fragments laterally and releasing the contaminant from the base material The dry-ice fragments instantly sublimate, which adds a lifting force that speeds the removal of the contaminant Removed debris falls to the ground, and the CO_2 (now gas) returns to the atmosphere Because the pellets vaporize, they do not pose a collection, treatment, or disposal problem, however, collection of the removed debris is required Use of CO_2 is advantageous as regards radioactive contamination because it does not become radioactive and because no secondary waste is produced The airborne contamination potential is typical of that of other blasting actions

A typical system consists of two major components a pelletizer that converts liquid CO_2 into dry-ice snow and a cleaning station from which the pellets are stored and blasted The cleaning station is portable and may be used to clean equipment in place, but it may also be used to clean dismantled equipment that has been transported to a centralized cleaning area where the pelletizer is located

1 3.8.2 Applications

Blasting with C02 has proven effective with plastics, ceramics, composites, and stainless steel Wood and some soft plastics could be damaged, and brittle materials may shatter Hard coatings that bond very firmly to the base material may be removed effectively by this technique Additionally, soft contaminants such as grease and oil tend to splatter and may require specialized applications procedures and collection systems If the object being cleaned is porous, soft contaminants may be pushed into the base material However, this technique is very effective for hardened, baked-on grease

Some cooling takes place in the base material, but the amount of cooling seldom exceeds 40°F In some applications, cooling makes a small contribution to the cleaning, principally with those contaminants that break up more easily as a result of thermal shock (i e , those with high moisture content or a high freezing point) The likelihood of damage resulting from cooling is remote, but material analysis should be performed before using this technique on components that may potentially be reused.

In general, $C0_2$ blasting is best applied in a room or booth that is dedicated to that purpose to contain the loosened debris and to isolate the noise of blasting, which can range from 75 dB to 125 dB In a normal workspace, ventilation is usually sufficient to prevent undue $C0_2$ buildup, in a confined space, however, ventilation needs to be actively monitored Because $C0_2$ is heavier than air, placement of exhaust vents is best at or near ground level Static electricity may be generated during the blasting process, therefore the component being cleaned should be grounded (Alpheus)

1.3.9 Hydroblasting

1.3.9.1 Description of Technique

In the hydroblasting technique, a high-pressure (several thousand pounds per square inch) water jet is used to remove contaminated debris from surfaces The debris and water are then collected, treated, and disposed of Figure 9 4 is a schematic diagram of the hydroblasting technique Use of the correct lance tip is critical to producing desired results. Configurations range from a jet tip, which produces a narrow stream, to a flat fan shape, which produces flow similar to a point scraper in form The treated surface may require painting or other refinishing methods if the surface is to be reused Many manufacturers produce a wide range of hydroblasting systems and high-pressure pumps

1.3.9.2 Applications

This technique is recommended for surfaces that are inaccessible to scrubbing or that are too large for scrubbing Hydroblasting can be used on contaminated concrete, brick, metal, and other materials It is not applicable to wooden or fiberboard materials In general, the technique is very effective, completely removing surface contamination On the average, hydroblasting removes 3/16-3/8 in of concrete surface at the rate of 40 yd2/hr Hydroblasting may not effectively remove contaminants that have penetrated the surface layer (Esposito et al

1985) However, variations such as hot or cold water, abrasives, solvents, surfactants, and various pressures that may increase the effectiveness of decontamination can easily be incorporated into the technique

Water lances have been successfully used to decontaminate pump internals, valves, cavity walls, spent-fuel pool racks, reactor vessel walls and heads, fuel-handling equipment, feedwater spargers, floor drains, sumps, interior surfaces of pipes, and storage tanks DFs of up to several hundred have been obtained Experience at one site indicated that DFs of 2-50 could be achieved using water only and that DFs of 40-50 could be achieved if a cleaning agent, (e g , Radiac-Wash) was added Personnel at the site recommend an initial treatment at lower pressures (500 psi) because the lower pressures perform just as well as higher pressures (3,000-5,000 psi)

To decontaminate pipe runs, a variation of the water lance -- the pipe mole -- is used In this method, a high pressure nozzle head is attached to a high-pressure flexible hose and inserted into pipe runs The nozzle orifices are angled to provide forward thrust of the nozzle so that the hose can be dragged through the pipe

Hydroblasting has also been used to decontaminate nuclear facilities, remove explosives from projectiles, and decontaminate military vehicles Hydroblasting also has been employed commercially to clean bridges, buildings, heavy machinery, highways, ships, metal coatings, railroad cards, heat exchanger tubes, reactors, piping, etc Given the volume of water generated, installation of sumps and external wastewater storage tanks may be necessary Existing sumps or water collection systems may be used, although they must be checked for leaks to ensure that contamination does not inadvertently migrate to another medium

1.3.10 Ultra-High-Pressure Water

1.3.10.1 Description of Technique

In this technique, water is pressurized up to 55,000 psi by an ultra high-pressure intensifier pump The water is then forced through a small-diameter nozzle that generates a high-velocity water jet at speeds of up to 3,000 ft/s This is the same technique used in abrasive water-jet cutting except that for cleaning purposes the nozzle is mounted in a cleaning head With the cleaning head attached to a lance, it can be manually moved about the surface being decontaminated Surface contaminants are first eroded and then removed by the water jet Deeper penetration of the surface is possible by adding abrasives to the water jet, however, care should be taken to not damage or cut through the material The contaminant and wastewater require a processing system in which the contaminant is separated, containerized, and disposed of and the wastewater treated and recycled

1.3.10.2 Applications

Concrete, metallic components, structural steel, and ceramic tile are just a few of the materials that can be decontaminated with ultra high-pressure water Water jets can remove paint, coatings, and hard-to-remove deposits without damaging the underlying surface They can also remove galvanized layers from sheet metal The decontamination efficiency of the technique is dependent on a number of parameters water pressure and flow rate, nozzle/cleaning head configuration, distance of the cleaning head to the surface, and translation speed These parameters must be evaluated, along with the geometric complexities of the substrate, to achieve optimum results

Because water jets are omni directional and have very little thrust, they are readily adapted to robotics or remote operation Moreover, the power unit is basically the same as that used for water-jet cutting Therefore, with minor modifications, the unit can be used for either technique as long as the appropriate nozzle is used (i e , a cleaning head or a cutting head) (MMES 1993, Flow International, K&S Engineering)

1.3.11 Shot Blasting

1.3.11.1 Description of Technique

Although the shot blasting technique was originally developed and marketed as a surface preparation technique to enhance coating adhesion, it can be used to remove contaminants from floors and walls Shot blasting is an airless method that strips, cleans, and etches the surface simultaneously The technique is virtually dust free, so the potential for airborne contamination is very low The surface is left dry and free from chemicals, so additional waste treatment is not required

Portable shot blasting units move along the surface that is being treated as the abrasive is fed into the center of a completely enclosed centrifugal blast wheel As the wheel spins, the abrasives are hurled from the blades, blasting the surface. The abrasive and removed debris are bounced back to a separation system that recycles the abrasive and sends the contaminants to a dust collector Larger shot removes more concrete, and the etch depth can be controlled by varying the speed of the unit Units are available that can remove an up to 1/4-in -thick surface in a single pass Units are also available for vertical surfaces

The contaminated debris and contaminated shot must be treated and disposed of The mobile unit must also be decontaminated

1.3.11.2 Applications

Shot blasting is generally used for concrete surfaces, but it can be applied to metallic components such as storage tanks Shot blasting effectively cleans surfaces that have been exposed to acids, caustics, solvents, grease, and oil It can also remove paint, coatings, and rust

1 3.12 Wet Abrasive Cleaning

1.3.12.1 Description of Technique

A wet abrasive cleaning system is a closed-loop, liquid abrasive (wet grit blasting) decontamination technique The system uses a combination of water, abrasive media, and compressed air and is applied in a self-contained, leak tight, stainless steel enclosure There is no danger of airborne contamination because a self-contained HEPA air ventilation system maintains negative pressure inside the cabinet The radioactive waste is mechanically separated from the cleaning media, resulting in a very low waste volume The water can be recycled and filtered, eliminating any access to wastewater drainage

The system is designed based on field experience and is governed by ALARA concerns The system uses no soluble or hazardous chemicals, only the abrasive media (e g , glass beads, aluminum oxide, silicon carbide, ceramics) and water

1.3.12.2 Applications

Wet abrasive cleaning is being used by many nuclear facilities to remove smearable and fixed contamination from metal surfaces such as structural steel, scaffolds, components, hand tools, and machine parts The equipment can be used on close-tolerance parts such as turbine blades or values where the removal of metal is not desired, or it can be adjusted to remove heavy-duty corrosion and paint by varying the amount of air pressure and media

A basic 4-ft x 4-ft x5-ft or a larger 4-ft x 8-ft x 7-ft system provides enough space in which to decontaminate small tools or heavy, large-scale parts If a material cannot be cut down to a smaller size (e g , long I-beams), it can be fed through small cabinets Most booths are custom designed to specific configurations and sizes

1.3.13 Grit Blasting

1 3.13.1 Description of Technique

The grit blasting technique, commonly called sand blasting and abrasive setting, has been used since the late 1800s This technique, which uses abrasive materials suspended in a medium that is projected onto the surface being treated, results in a uniform removal of surface contamination Compressed air or water or some combination of both can be used to carry the abrasive Removed surface material and abrasive are collected and placed in appropriate containers for treatment and/or disposal

1.3.13.2 Applications

Grit blasting is applicable to most surface materials except those that might be shattered by the abrasive, such as glass, transite, or plexiglass It is most effective on flat surfaces, and because the abrasive is sprayed it is also applicable on hard-to-reach areas such as ceilings or areas behind equipment Nonetheless, obstructions close to or bolted to walls must be removed before applications, and precautions should be taken to stabilize, neutralize, or remove combustible contaminants because some abrasives can cause some materials to detonate Static electricity may be generated during the blasting process, therefore, the component being cleaned should be grounded Remotely operated units are available

Abrasives may be applied under either wet or dry conditions Under dry conditions, dust-control measures may be needed to control dusts and/or airborne contamination This problem can be reduced by using filtered vacuum systems in the work area When water is used to apply the abrasive, large volumes of waste are produced that include the wastewater, the abrasive, and the removed debris These wastes must be properly treated and/or disposed of If the wastewater can be recycled, it may or may not need to be treated before it is reused Depending on the application, the following variety of materials can be used as the abrasive media

- minerals (e g , magnetite or sand),
- steel pellets,
- glass beads/glass frit,
- plastic pellets, and
- natural products (e g , rice hulls or ground nut shells)

Silica has also been used as an abrasive, however, its use is not recommended because silica is moderately toxic as a highly irritating dust and is the chief cause of pulmonary disease Prolonged inhalation of dusts containing free silica may result in the development of a disabling pulmonary fibrosis known as silicosis

A grit-blasting system consists of a blast gun, pressure lines, abrasives, and an air compressor Several grit-blasting equipment manufacturers and contractors are available Labor cost could be high because it is a relatively slow and labor-intensive technique Large amounts of abrasive are required, so costs are necessarily dependent on the type of abrasive used (Esposito et al 1985, Wood, Irving, and Allen 1992)

1.3.14 Grinding

1.3.14.1 Description of Technique

The grinding technique removes thin layers of surface contamination from concrete In many cases, the contamination is limited to the paint coating or concrete sealer finish The technique involves abrading the surface that is being treated using coarse-grained abrasives in the form of water-cooled diamond grinding wheels or multiple tungsten-carbide surfacing discs Machines to power these abrasives are floor-type grinders who grinding heads rotate in a circular fashion parallel to the floor Water required for cooling is injected into the center of the grinding head, reducing the amount of dust Supplementary contamination control can be accomplished using HEPA-filtered vacuum systems and wet vacuums attached to or held near the machine The surface may be moistened before and during grinding to hold down dust levels

1.3.14.2 Applications

In general, grinding is recommended for use where thin layers of contamination need to be removed If the contamination is deep, the grind wheels or discs are quickly worn down, which decreases the overall effectiveness of the technique

A typical diamond grinding wheel (used on a floor grinder) is capable of removing several thousand square feet of surface per day to an approximate depth of 1/2 in In smaller areas, the wheel can remove up to 1 inc of surface per day The machine can be operated by one operator Floor and hand-held grinding machines have been successfully used at the San Onofre Unit 1 Nuclear Plant to remove surface contamination

1.3.15 Scarifiers

1.3.15.1 Description of Technique

Scarifiers physically abrade both coated and uncoated concrete and steel surfaces The scarification process removes the top layers of contaminated surfaces down to the depth of sound, uncontaminated surfaces A decade ago, concrete scarification was considered a radical approach to decontamination owing to poor performance of the tools and inability to provide a uniform surface profile upon removal of the contaminants Today's refined scarifiers are not only very reliable tools, but also provide the desired profile for new coating systems in the event the facility is to be released for unrestricted use For steel surfaces, scarifiers can completely remove contaminated coating systems, including mill scale, leaving a surface profile to bare metal To achieve the desired profile and results for contaminated concrete removal, a scabbling scarification process is implemented, for steel decontamination, a needle scaling scarification process is used

Scabbling

Scabbling is a scarification process used to remove concrete surfaces Manufacturers of scabblers typically incorporate several pneumatically operated piston heads to simultaneously strike (i e , chip) a concrete surface Today's scabblers range from hand-held scabblers to remotely operated scabblers, with the most common versions incorporating three to five scabbling pistons mounted on a wheeled chassis Because scabbling can cause a cross-contamination hazard, vacuum attachments and shrouding configurations have been incorporated by a few scabbling equipment manufacturers According to one manufacturer's claim, users can scabble with no detectable increase in airborne exposures above background levels (Pentek)

One of three types of scabbling bits, which are mounted on the piston heads, can be used a 6-point anvil bit for surface scabbling, a cross anvil bit for aggressive surface reduction, or a 9-point bit for aggressive removal, leaving a smooth, finished surface profile. All bits have tungsten-carbide cutters and range from 1 3/4 to 2 1/2 in in diameter, depending on the manufacturer's configuration The bits have an operating life of approximately 80 hr under normal use

Before scabbling, combustibles must be stabilized, neutralized, and/or removed In practice, floor scabblers can only be moved to within 1/2 in of a wall Other hand-held scabbling tools are manufactured to remove the last 1/2 in of concrete flooring next to a wall, as well as remove surface concrete on walls and ceilings This technique is a dry decontamination method -- no water, chemicals, or abrasives are required The waste stream produced is only the removed debris

The approximate removal rates for a scabbler vary depending on the type of bit that is used In general, the removal rate for a 6-point anvil bit is 30-40 ft^2/hr based on the removal of a 1/6-in -deep layer The removal rate for a cross anvil bit varies inversely to the thickness removed 14-24 ft^2/hr for a 1/4-in -deep layer, 7-12 ft^2/hr for a 1/2-in -deep layer, and 3-6 ft^2/hr for a 1-in-deep layer

Needle Scaling

Needle scaling is a scarification process used in both concrete and steel surface removal These tools are usually pneumatically driven and use uniform sets of 2mm, 3mm, or 4mm needles to obtain the desired profile and performance The needle sets use a reciprocating action to chip the contamination from the surface Some manufacturers have added specialized shrouding and vacuum attachments to collect the removed dust and debris during needle scaling with the result of no detectable concentrations above background levels

For removing surface contamination from steel surfaces where combustibles were once stored, copper beryllium needle sets can be used to reduce the risk of needle sparking Needle scalers are an exceptional tool in tight, hard-to-access areas, as well as for wall and ceiling surface decontamination This technique is a dry decontamination process and does not introduce water, chemicals, or abrasives into the waste stream Only the removed debris is collected for treatment and disposal

Production rates vary depending on the desired surface profile to be achieved Nominal production rates range from 20 to 30 ft^2/hr

1.3.15.2 Applications

Scabblers are best suited for removing of thin layers (up to 1 in thick) of contaminated concrete (including concrete block) and cement It is recommended for instances where (1) no airborne contamination can occur, (2) the concrete surface is to be reused after decontamination, or (3) for instances in which the demolished material is to be cleaned before disposal The scabbled surface is generally level, although coarsely finished, depending on the bit used If necessary, after release, the surface can be finished with a concrete cap and an epoxy, polymer, or similar finish This technique is suitable for both large open areas and small areas

Needle scaling is best suited for removing of surface contamination and coatings from steel surfaces, piping, and conduit Needle scalers with vacuum attachments and shrouding are ideal for clean room surface removal operations, dustless decontamination operations, and in the reduction of containment structures and ventilation schemes They an also remove surface contamination from concrete surfaces (up to 1/2 inc thick) Needle scaling is generally more versatile than scabbling and is highly effective on concrete walls and ceilings (Esposito et al 1985, Pentek, MacDonald Air Tool)

A proprietary system integrates scabblers and scarifiers into a family of remotely and manually operated scarification equipment for dustless decontamination of concrete and steel The system incorporates a high-performance vacuum/waste packaging unit in conjunction with pneumatically operated scabblers and needle scalers to safety remove contaminated material Dust and debris are captured at the cutting-tool surface, which minimizes cross contamination The HEPA filtration design incorporates a patented fill-seal drum changeout method that allows the operator to fill, seal, remove, and replace the waste under controlled vacuum conditions The unit can accommodate 55- and 23-gal drums It can also simultaneously support several drum sizes, including up to three scabbler/needle scalers from a 100-ft distance The remotely operated floor scabbler has an on-board vacuum packaging unit The smaller scabbler and needle scaler have vacuum ports that can be attached to the vacuum waste packaging unit Although the equipment is designed to work as an integrated system, the individual components can also be operated as stand-alone units that can be used with conventional air supplies and vacuum systems

1 3 16 Milling

1 3 16.1 Description of Technique

There are two milling techniques, one used for shaving metals and one for shaving concrete Metal milling is the technique by which a machine shaves off a layer of material (up to 1/8 in) from a surface using rotating cutters The most commonly used method involves feeding the workpiece past stationary cutters that re perpendicular t the cutter's axis Other types of milling machines (i e , where the workpiece is stationary and the cutter or cutters move) are available Waste consists of the machined-off chips and any cooling/lubricating fluids (which can be recycled if necessary)

Concrete milling is similar to concrete scabbling or scarifying, except that it may be applied to a much larger surface area Large, paving-type equipment is generally used to shave the concrete surface Approximately 2 1/2-10 in can be removed in this manner

1 3 16 2 Applications

Because of the setup time for configuration (1/2-3/4 hr), metal milling is most effective when there is a large number of similarly shaped items to be decontaminated After the equipment is set up and loaded, about 2 1/2 ft^2/hr can be milled Concrete milling is most effective when used on large, open, horizontal surfaces No documentation on it s use as a decontamination technique has been found, however, metal milling has been used at the Oak Ridge K-25 Site to decontaminate individual metal items (MMES 1993)

1.3.17 Drill and Spall

1.3.17.1 Description of Technique

The drill-and-spall technique was developed to remove contaminated concrete surfaces without demolishing the entire structure All potential obstructions to the drill or spall rig should be removed and combustible sources stabilized, neutralized, or removed The technique involves drilling 1-1 1/2 -in -diameter holes approximately 3 in deep into which a hydraulically operated spalling tool is inserted The spalling tool bit is an expandable tube of the same diameter as the hole A tapered mandrel is hydraulically forced into the hole to spread the fingers and spall off the concrete The holes are drilled on approximately 12-in centers so that the spalled area from each hole overlaps the next The removed concrete is collected, treated, and/or disposed of If the contamination is deeper than that which can be removed in one pass, a second pass may need to be performed

1.3.17.2 Applications

The drill-and-spall technique is applicable to concrete only (not concrete block) and is recommended for removing surface contamination that penetrates 1-2 in into the surface Removal of the near-surface contamination in this manner decreases the amount of contaminated material that needs to be disposed of prior to demolition This technique is effective for large-scale, obstruction-free applications, the only limit being the interior building configuration The treated surface may require a concrete cap if a smooth surface is desired because any rebar is exposed and the surface is generally left in an overall rough condition

A concrete spaller was used at Pacific Northwest Laboratories (PNL) to remove 1 in of contaminated concrete from the surface of air lock cover blocks The concrete spaller was first set up and tested on nonradioactive concrete to allow hands-on training of personnel During these equipment tests, it was found that if the surface was first painted with a latex paint, it acted to keep the spalled aggregates together, somewhat in the same manner as a fixative A nominal 8-in spacing between drilled holes was found to be satisfactory The interface between the push rod and bit was lubricated between each spalling operation rather than every four operations as recommended This lubrication sequence may have helped prevent wear or galling-type failures One spalling bit was replaced when the wedge portion broke away from one of the expanding prongs During operation, workers were required to wear respirators

1.3.18 Paving Breaker and Chipping Hammer

Although paving breakers and chipping hammers are primarily used in demolition activities, they can be used to remove surface contamination up to 6 in thick The surface is left very rough and resurfacing is required

1.3.19 Expansive Grout

Although expansive grout is primarily used as a demolition technique, it can also be used as a decontamination method to remove a thick layer of contaminated concrete

1.4 EMERGING TECHNOLOGIES

In the last decade, many decontamination development activities have been initiated in anticipation of the extensive program activities scheduled to begin in the next 10 yr Most of these technologies have not yet been field tested Regardless, a fraction of these development activities appears to be more effective in special situations than the established chemical and mechanical methodology currently being used

A literature review indicates some of these technologies may be more well developed than others Because these technologies have not been field tested, there is no way to determine their effectiveness at this time DOE has provided funding in this project to demonstrate such technologies The purpose of this section is to develop an awareness of these ongoing activities

1.4.1 Light Ablation

1.4.1.1 Description of Technique

Light ablation uses the absorption of light energy and its conversion to heat (photopyrolysis) to selectively remove surface coating or contaminants For a given frequency of light, some surfaces reflect the beam, some (such as glass) transmit the beam, and others absorb the light energy and convert it to heat There are three candidate light sources for use in light ablation applications, laser, xenon flash, and pinch plasma lamps The first two of these are currently commercially available, and the third is under development

If the properties of a specific contaminant/substrate combination are known, a proper light frequency can be selected for use If the light intensity is high enough, the surface film can be heated to 1,000-2,000°C in microseconds or less, while the substrate is virtually unaffected With each light pulse, some of the surface contaminant is transformed from a solid into a plasma, which erupts from the surface The high-temperature gas or plasma produces a brilliant flash of light and a loud audible report (up to 90 dB) from the plasma's supersonic shockwave Photochemical and thermochemical reactions, such as organic destruction occur within the plasma, but there is no flame because the shock wave pushes ambient oxygen away from the gas plasma

This technique has the ability to operate at a distance by transporting the light through periscopes or fiber optics up to 450 ft long The small laser heads, fiber optic cables, or compact flash blast heads can easily be adapted for manipulator use These small components can be designed into a robotic viewing, aiming, and handling system to gain access to and decontaminate otherwise inaccessible areas (Flesher, 1992)

1.4.1.2 Applications

Surface coatings that have been removed by the high-energy light technique range from epoxy paints, adhesives, and corrosion products to centuries of accumulated airborne pollutants and 1/4-in layers of concrete Surfaces contaminated with several different compounds or particles may require multiple passes, changing the frequency and/or intensity to match a particular contaminant and remove it with each pass Research in this area of decommissioning purposes is being performed by Westinghouse Hanford Company and Ames Laboratory at Iowa State University

Because no chemicals or abrasives are used, there is no increase in secondary waste volume In some cases, a light water spray may be used, however, no liquid runoff or dissolution is required. In most applications, the volume of waste should be equal to or less than the actual volume of the coating removed The high-energy light and plasma generated are frequently accompanied by photoreaction, which reduces organic molecules to their basic gaseous constituents, to reduce the overall solid waste volume

This technique minimizes the potential for exposures that result from contact with contaminated surfaces because the end effectors for both the xenon flash (at 1/2-1 in) and the laser (at 50 ft or more) are at a distance from the contaminated surface These end effectors are small (under 10 lb) and are attached to their power supplies and controls by cables or fiber optics up to 450 ft long Therefore, operators are not required to make contact with the surface, and the equipment is easily adaptable to remote operations

1.4.2 Microwave Scabbling

A new method for surface removal of concrete has been developed at the Oak Ridge Y-12 plant This technique directs microwave energy at contaminated concrete surfaces and heats the moisture present in the concrete matrix Continued heating produces steam-pressure-induced internal mechanical stresses and thermal stresses When combined, these two stresses burst the surface layer of concrete into small chips The chips are small enough to be collected by a HEPA-filtered vacuum system that is connected at the tailing end of the mobile unit Less than 1% of the debris is small enough to pose an airborne contamination hazard Larger debris can be manually vacuumed The concrete removed can be controlled by choosing the frequency and power of the microwave system Higher frequencies concentrate more of their energy near the surface and remove a thinner layer of material A thicker layer can be removed by using lower frequencies, which are absorbed deeper in the concrete

This technique is applicable to concrete surfaces only because metallic surfaces negatively impact the performance of the technique Steam was observed escaping from the outer edges of a support bolt during laboratory-scale tests The effect of steel-reinforcing bars, however, does not seem to pose any problems because they are usually far below the surface A layer of paint had negligible impact on performance during testing Cracks in the surface allow steam to escape and have a negative effect on performance This technique generates little dust and does not require the concrete surface to be wet, which eliminates the cost of disposal/treatment (with the exception of the removed debris) The mobile test unit collected approximately 95% of the removed debris It is expected that a larger vacuum system can collect 98% or more of the debris Currently, the test unit is applicable only to floors, however, future phases of development are expected for wall and ceiling applications No information has been given on the amount of microwave energy that may be transferred (i e , leaks) from the surface being treated and the applicator If the amount of leakage is above the American National Standards Institute (ANSI) standard of 5 mW/cm^2 then appropriate measures must be taken to eliminate this leakage for safety purposes (White, 1992, DiDonato, 1993)

Appendix 3
Building 779 Reconnaissance Level Characterization Survey Hazard Summary Matrix

Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
001	Basement sumps	None	- Moderate levels of loose and fixed surface contamination, Radioactive contaminated process waste water with hazardous chromium and lead	Floor/Wall/Ceiling materials and piping insulation possible ACM	Possibly present on sump surfaces and sludge	None	
100	Maintenance Airlock	None	No loose surface contamination Possible isolated spots of fixed low level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
101	Hallway	None	No loose surface contamination - Possible isolated spots of fixed low-level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
103	Men's Locker Room	None	- No loose surface contamination - Possible isolated spots of fixed low-level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
103A	Men s Locker Room	None	- No loose surface contamination. Possible isolated spots of fixed low level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
103B	Men s Locker Room	None	- No loose surface contamination Possible isolated spots of fixed low level contamination	Floor/Wall/Ceiling materials and piping insulation, possible ACM	None	None	
104	Hallway	None	- No loose surface contamination - Possible isolated spots of fixed low level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
105	Hallway	None	- No loose surface contamination - Possible isolated spots of fixed low level contamination	Floor/Wall/Ceiling materials and piping insulation, possible ACM	None	None	
106	Office	None	- No loose surface contamination. - Possible isolated spots of fixed low-level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
107	Office	None	- No loose surface contamination - Possible isolated spots of fixed low level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	

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Building 779 Reconnaissance Level
Characterization Survey Hazard Summary Matrix

Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
108	Office	None	- No loose surface contamination Possible isolated spots of fixed low-level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
109	Office	None	No loose surface contamination Possible isolated spots of fixed low-level contamination	Floor/Wall/Ceiling materials and piping insulation, possible ACM	None	None	
110	Office	None	No loose surface contamination Possible isolated spots of fixed low-level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
110A	Office	None	- No loose surface contamination Possible isolated spots of fixed low-level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
111	Office	None	- No loose surface contamination - Possible isolated spots of fixed low-level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
113	Machine Shop	None	No loose surface contamination - Possible isolated spots of fixed low-level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	Possibly present in equipment oil - to be sampled	
114	Storage	None	No loose surface contamination - Possible isolated spots of fixed low-level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	Potentially present - Addition characterization to be performed	None	
115	Office/Stroage	None	- No loose surface contamination - Possible isolated spots of fixed low-level contamination	Floor/Wall/Ceiling materials and piping insulation, possible ACM	None	None	
115A	Electronics Labs	None	- No loose surface contamination Possible isolated spots of fixed low-level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
116	Hallway	None	No loose surface contamination - Possible isolated spots of fixed low-level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	

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Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
116A	Office	None	No loose surface contamination - Possible isolated spots of fixed low level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
116B	Office	None	No loose surface contamination Possible isolated spots of fixed low-level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
117	Emergency Generator	None	No loose surface contamination - Possible isolated spots of fixed low-level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	-Possibly present in electrical equipment - to be confirmed	
118	Hallway	None	- No loose surface contamination - Possible isolated spots of fixed low-level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
119	Hallway	None	- No loose surface contamination - Possible isolated spots of fixed low-level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
121	Machine Shop	None	-No Loose surface contamination - Possible isolated spots of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation, possible ACM	Possible present in equipment Additional characterization to be performed	None	
121A	Electrician Office	None	-No loose surface contamination - Possible isolated spots of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
121B	Security Access	None	No loose surface contamination - Possible isolated spots of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
122	Control Room	None	-No loose surface contamination - Possible isolated spots of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	

Appendix 3
Building 779 Reconnaissance Level
Characterization Survey Hazard Summary Matrix

Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
123	Store Room	None	-No loose surface contamination Possible Isolated spots of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
124	Office	None	-No loose surface contamination - Possible Isolated spots of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
125	Office	None	-No loose surface contamination - Possible isolated spots of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
126	Utilities Room	None	-No loose surface contamination - Possible isolated spots of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM		Possibly present in electrical equipment - to be confirmed	
127	Utilities Room	None	No loose surface contamination Possible isolated spots of low level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	Potentially present Addition characterization to be performed	None	
128	Instrument Repair Facility	None	-No loose surface contamination - Possible isolated spots of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
130	Chemical Storage	None	- Little or no loose surface contamintion - Known areas of fixed contamination on floors High contamination levels inside gloveboxes	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	

Appendix 3
Building 779 Reconnaissance Level Characterization Survey Hazard Summary Matrix

Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
131	Aqueous Lab	Present in gloveboxes and ventilation duct Quantities and location classified	-No loose surface contamination Possible isolated spots of low-level fixed contamination - Internally contaminated pumps	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	Known materials used in Room Plutonium oils solvents hydrochloric Acid and Calcium Chloride RCRA Storage Area
132	Office	None	-No loose surface contamination Possible isolated spots of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
133	R & D Pyrochemical Lab	- Present in gloveboxes and ventilation duct. Quantities and location classified	- Little or no loose surface contamintion. Known areas of fixed contamination on floors - High contamination levels inside gloveboxes	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	Americium Tantalum Oils Solvents Calcium Calcium Chloride Magnesium Gallium Zinc Tin Aluminum Dicesium Hexachloro plutonate RCRA Storage Area Glovebox/mixed residue
134	Flammable Liquid Storage	None	-No loose surface contamination Possible isolated spots of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	Potentially present - Addition characterization to be performed	None	
135	RCT Storage Area	None	-No loose surface contamination Possible isolated spots of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
136	Chem Tech Office	None	-No loose surface contamination Possible isolated spots of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation, possible ACM	None	None	

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Characterization Survey Hazard Summary Matrix

Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
137	Aqueous R &D Lab	Present in gloveboxes and ventilation duct - Quantities and location classified	Little or no loose surface contamintion Known areas of fixed contamination on floors High contamination levels inside gloveboxes	Floor/Wall/Ceiling materials and piping insulation possible ACM	Potentially present due to research/machining operations - Additional characterization to be performed	None	Known materials used in rm - Pu Americium Tantlaum Oils Solvents Aluminum Zinc Potassium Cadium Hydrochloric Acid Nitric Acid Phosphoric Acid Calcium Chloride Acid Ammonium Hydroxide - RCRA Permitted Storage Area
138	Excess Chemical Storage		-No loose surface contamination Possible isolated spots of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
139	Soil Analysis Lab	Small quantity prsent in ventilation duct Quantities and location classified	Little or no contamination present on room surfaces Possible isolated locations of fixed contamination Hoods &B-Boxes have moderate levels of contamination Room contains a shielded Amercium source	Floor/Wall/Ceiling materials and piping insulation possible ACM	Potentially present due to chemical research activities - Additional characterization to be performed		Known Materials Used in Room Plutonium Amercium Uranium Sodium Hydroxie

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Building 779 Reconnaissance Level
Characterization Survey Hazard Summary Matrix

Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
140	Metal Preparation Lab	None	Little or no loose contamination present on room surfaces Possible isolated locations of fixed contamination B-Boxes contaminated with Uranium and Beryllium		Potentially present due to machining operations Additional characterization to be performed	None	Known materials used in room Depleted Uranium Beryllium
140A	Scanning Electron Support Room	None	-No loose surface contamination - Possible isolated spots of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
140B	Scanning Electron Microscope (SEM)	None	No loose surface contamination Possible isolated spots of low level fixed contamination SEM likely non-contaminated	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	

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Building 779 Reconnaissance Level
Characterization Survey Hazard Summary Matrix

Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
141	ESCA	None	-No loose surface contamination Possible isolated spots of low-level fixed contamination - ESCA likely non-contaminated	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
141A	Microprobe	None	-No loose surface contaminations Possible isolated spots of low-level fixed contamination - Microprobe is internally contaminated	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
141B	Scanning Electron Microscope (SEM)	None	No loose surface contamination Possible isolated spots of low-level fixed contamination SEM likely non-contaminated	Floor/Wall/Ceiling materials and piping insulation possible ACM	None		
141C	Metallograhp & Optical Reduction Equipment	None	-No loose surface contamination Possible isolated spots of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	Potentially present Additional characterization to be performed		

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Building 779 Reconnaissance Level Characterization Survey Hazard Summary Matrix

Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
142C	Utilities Room	None	No loose surface contamination Possible isolated spots of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	Potentially present Additional characterization to be performed		
146	Office	None	No loose surface contamination Possible isolated spots of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM			
147	Office/Storage	None	-No loose surface contamination. - Possible isolated spots of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM			
149	Hallway	None	-No loose surface contamination on room surfaces - Possible isolated spots of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None		
150	Metal Joining Facility	- Present in welding hood and ventilation ducting	No loose surface contamination on room surfaces - Possible isolated spots of fixed low-level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	Potentially present in electron beam welding equipment		
		Quantity and location is classified	Possible internal contamination in welding equipment	- Additional sampling to be performed	Additional characterization to be performed	Possible Electrical transformers to be sampled	Known materials used in room Pu hydrochloric nitric hydroflouric oxalic sulfuric acids acetone ethanol copper sulfate and alcohol

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Building 779 Reconnaissance Level
Characterization Survey Hazard Summary Matrix

Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
151	Office	None	No loose surface contamination on room surfaces Possible isolated spots of fixed low level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM			
152	Experimental Casting Lab	Present in gloveboxes and ventilation duct - Quantities and location classified	Little or no loose contamination on room surfaces Fixed contamination on floors/walls High contamination levels in gloveboxes	Floor/Wall/Ceiling materials and piping insulation possible ACM	None suspected	Possibly present in electrical equipment to be sampled	Vault on north end of room requires further radiological characterizaton
153	Drum Stagging Room	None	Little or no loose contamination - Fixed contamination on floors	Floor/Wall/Ceiling materials and piping insulation possible ACM	Non-Suspect		
153A	Compact Room	None	Little or no loose contamination on room surfaces Fixed contamination on floors/walls High contamination levels in gloveboxes	Floor/Wall/Ceiling materials and piping insulation possible ACM	Possibly Present Additional sampling to be performed		

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Building 779 Reconnaissance Level Characterization Survey Hazard Summary Matrix

Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
153B	Downdraft Room	Present in gloveboxes and ventilation duct Quantities and location classified	Loose contamination present on room surfaces Respiratory protection required - Fixed contamination on floors	Floor/Wall/Ceiling materials and piping insulation possible ACM	Possibly Present Additional sampling to be performed		
		Present in gloveboxes and ventilation duct	- Loose contamination likely present in ovrhead	Floor/Wall/Ceiling materials and piping insulation possible ACM	- Potentially present due to be processing activities		
			- Fixed contamination on floor/walls				
154	Plutonium Hydriding Lab	Quantities and location classified	- High contaminations levels in glovebox. -Contaminated oil in two vacuum pumps		Additional characterization to be performed	None	Known materials used in process Plutonium sulfamic acid hydrolic nitric acid Tantalum and other heavy metals
155	Plutonium Sample Mounting Lab	Present in gloveboxes and ventilation duct Quantities and location classified	Loose contamination likely in overhead areas - Fixed contamination on floors/walls High contamination levels in glovebox.	Floor/Wall/Ceiling materials and piping insulation possible ACM Transite Line Hood	None	None	Acids residue inside hoods and gloveboxes
156	Calorimeter Room	None	- Little or no loose contamination on room surfaces Fixed contamination possible on floors	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	

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Building 779 Reconnaissance Level
Characterization Survey Hazard Summary Matrix

Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
157	Tensile Testing Lab	Present in gloveboxes and ventilation duct Quantities and location classified	Little or no loose contamination on floors/walls - Fixed contamination on floors - Contamination present inside gloveboxes	Floor/Wall/Ceiling materials and piping insulation possible ACM	None		
159	Waste Packaging	- Some holdup prsent in ventilation ducting Quantity and locatio is classified	No loose surface contamination Isolated locations of fixed contamination on floors/walls	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	90 day RCRA Storage Unit
160	Pyrochemical Development Facility	Present in gloveboxes and ventilation duct Quantities and location classified	Areas of loose surface contamination - Widespread fixed contamination - High contamination levels inside gloveboxes	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	Possibly present in electrical transformer equipment to be sampled	Known materials used Calcium oxide magnesium oxide magnesium chloride sodium chloride and calcium chloride 90 day RCRA Storage Unit
160A	Material Storage (Vault)	None	No loose surface contamination on room surfaces Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	90 day RCRA Storage Unit

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Building 779 Reconnaissance Level
Characterization Survey Hazard Summary Matrix

Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
161	Janitor - Closet	None	- No loose surface contamination on room surfaces Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
162	Machining Lab	None	- No history of radioactive contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	Possibly present additional sampling required	Possible electrical transforms require sampling	
163	Empty Drum Storage	None	- No loose surface contamination on room surfaces. - Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
163A	Office	None	- No loose surface contamination on room surfaces - Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
164	Hallway (Airlock)	None	- No loose surface contamination on room surfaces - Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
166	Entry Way		- No loose surface contamination on room surfaces Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
167	Mens Locker Room	None	- No loose surface contamination on room surfaces - Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
167A	Mens Locker Room	None	No loose surface contamination on room surfaces Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	

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Building 779 Reconnaissance Level
Characterization Survey Hazard Summary Matrix

Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
170	Dumb Waiter	None	No loose surface contamination on room surfaces Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	Possibly present in electrical transformers additional sampling required	
171	Material Storage (Vault)	None	- No loose surface contamination on room surfaces - Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	- Potentially present due to storage of Be parts - Additional characterization to be performed	None	
172	Material Storage	None	- No loose surface contamination on room surfaces - Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
173	Utility Area	None	- No loose surface contamination on room surfaces - Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
201	Office	None	- No loose surface contamination on room surfaces - Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
201A	Office	None	No loose surface contamination on room surfaces - Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
202	Office	None	- No loose surface contamination on room surfaces - Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	Potentially present - Additional characterization to be performed	None	

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Building 779 Reconnaissance Level
Characterization Survey Hazard Summary Matrix

Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
202A	Office	None	No loose surface contamination on room surfaces Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	Potentially present Additional characterization to be performed	None	
203	Office	None	No loose surface contamination on room surfaces Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	Potentially present Additional characterization to be performed	None	
204	Office	None	No loose surface contamination on room surfaces Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	Potentially present - Additional characterization to be performed	None	
204A	Office	None	No loose surface contamination on room surfaces Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
204B	Office	None	No loose surface contamination Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
205	Conf Room	None	- No loose surface contamination Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
206	Office	None	No loose surface contamination Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
207	Office	None	- No loose surface contamination Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
207A	Office	None	- No loose surface contamination - Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	

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Building 779 Reconnaissance Level
Characterization Survey Hazard Summary Matrix

Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
207B	Office	None	- No loose surface contamination Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
207C	Office	None	- No loose surface contamination Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation, possible ACM	None	None	
208	Office	None	No loose surface contamination - Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	- Potentially present Additional characterization to be performed	None	
209	Office	None	- No loose surface contamination Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation, possible ACM	None	None	
210	Office	None	- No loose surface contamination. Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
210A	Office	None	- No loose surface contamination Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
211	Janitors Closet	None	No loose surface contamination Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
212	Office	None	No loose surface contamination Possible isolated spots of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
212A	Office	None	- No loose surface contamination - Possible isolated spots of fixed low level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
			- No loose surface contamination	Floor/Wall/Ceiling materials and piping insulation, possible ACM			

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Building 779 Reconnaissance Level
Characterization Survey Hazard Summary Matrix

Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
			- Fixed contaminations possible at isolated locations				
213	Office	None	Vacuum pump oil radioactive contaminated		None	None	Known materials used in room trichloroethane freon ethanol and methanol
214	Office	None	- No loose surface contamination Possible isolated spots of fixed low level contamination.	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
215	Hallway (Airlock)	None	- No loose surface contamination - Fixed contaminations possible at isolated locations	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
216	Hallway	None	No loose surface contamination - Possible isolated spots of fixed low level contamination.	Floor/Wall/Ceiling materials and piping insulation, possible ACM	None	None	
		- Present in gloveboxes and ventilation duct	- Little or no loose contamination on floors	Floor/Wall/Ceiling materials and piping insulation possible ACM			
217	Gas solid kinetic studies	Quantities and location classified	Fixed contam at isolated locations on floors/walls - High contamination levels inside gloveboxes and surface analysis equip Vacuum pump oil - radioactively contamination		None	None	Known materials used in room trichloroethane freon ethanol and methanol

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Building 779 Reconnaissance Level
Characterization Survey Hazard Summary Matrix

Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
		Present in gloveboxes and ventilation duct.	- Little or no loose contamination on floors/walls High contamination levels inside gloveboxes				
218	Gas solid kinetic studies	- Quantities and location classified	Fixed contaminations present on floors	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	Room contains C0-60 shielded source Known materials used in room oils solvents trichloroethane methanol freon and ethanol
219	Gas - solid kinetic studies	None	- No loose surface contamination Possible isolated spots of fixed low level contamination.	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
220	Gas solid kinetic studies	- Present in gloveboxes and ventilation duct Quantities and location classified	- Little or no loose surface contamination. - Fixed contaminations at isolated spots High contamination levels inside gloveboxes D154	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
221	Office/storage	None	No loose surface contamination - Possible isolated spots of fixed low-level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None		
221A	Storage	None	No loose surface contamination. - Possible isolated spots of fixed low level contamination	Floor/Wall/Ceiling materials and piping insulation, possible ACM	None		
221B	Office/Storage	None	- No loose surface contamination Know locations of fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None		

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Building 779 Reconnaissance Level Characterization Survey Hazard Summary Matrix

Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
221C	Office/Storage	None	No loose surface contamination - Know locations of fixed contamination.	Floor/Wall/Ceiling materials and piping insulation possible ACM	None		
222	Gas solid kinetic studies	- Present in gloveboxes and ventilation duct - Quantities and location classified	Little or no surface contamination Isolated locations of fixed contaminations - High contaminations levels inside gloveboxes	Floor/Wall/Ceiling materials and piping insulation possible ACM Transite inside hood	None		- Known materials used in room Plutonium uranium oils solvent, inks trichloroethane methanol freon and ethanol
222A	Storage room	None	- No loose surface contamination Possible isolated spots of fixed low level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None		
223	Coating studies	- Present in gloveboxes and ventilation duct - Quantities and location classified	- Little or no surface contamination - Isolated locations of fixed surface contaminations - Contamination present in hoods and vacuum systems	Floor/Wall/Ceiling materials and piping insulation possible ACM	Potentially present due to vapor deposition studies Additional characterization to be performed		- Known materials used in room - Plutonium uranium oils solvent inks trichloroethane methanol freon and ethanol
224	Decon Room	None	- No loose surface contamination. - Possible isolated spots of fixed low-level contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None		

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Building 779 Reconnaissance Level
Characterization Survey Hazard Summary Matrix

Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
225	Coatings Lab	None	Little or no loose surface contamination Fixed contaminations on floors Uranium contamination present in welding and vacuum equipment	Floor/Wall/Ceiling materials and piping insulation possible ACM	Suspected contamination Additional sampling to be performed	None	Known materials used in room Uranium beryllium nitric acid and ethyl alcohol
226	Stairway	None	No loose surface contamination Possible isolated spots of fixed contaminations	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
228	Met Lab	Present in gloveboxes and ventilation duct. Quantities and location classified	- Little or no loose surface contamination - Isolated spots of fixed surface contaminations - High contamination levels in gloveboxes and ventilated system	Floor/Wall/Ceiling materials and piping insulation possible ACM	- Potentially present Additional characterization to be performed	None	[illegible] uranium oils organic solvents isopropanol diamond paste and freon 90 day RCRA Storage Unit
229	Office	None	- No loose surface contamination Possible isolated locations of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
230	Office	None	- No loose surface contamination Possible isolated locations of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
231	Office	None	- No loose surface contamination - Possible isolated locations of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
232	Office	None	No loose surface contamination - Possible isolated locations of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	

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Building 779 Reconnaissance Level Characterization Survey Hazard Summary Matrix

Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
233	Office	None	No loose surface contamination Possible isolated locations of low-level fixed contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
234	Met Lab	Present in gloveboxes and ventilation duct. Quantities and location classified.	Little or no loose surface contamination - Isolated spots of fixed surface contaminations on floor - Contamination present in metallography and gloveboxes	Floor/Wall/Ceiling materials and piping insulation possible ACM	Potentially present - Additional characterization to be performed		Known materials used in room Plutonium oils organic solvent isopropanol nitric acid hydrofluric acid carbon tetrachloride and freon
234A	Met Lab	None	Little or no loose surface contamination - Known spots of fixed contaminations on floor - Internal surfaces of gloveboxes contaminated	Floor/Wall/Ceiling materials and piping insulation possible ACM	Potentially present Additional characterization to be performed		
234B	Dark Room	None	- Little or no loose surface contamination No known locations of fixed contaminations	- Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	Photo processing chemicals

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Building 779 Reconnaissance Level
Characterization Survey Hazard Summary Matrix

Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
235	Electron Microscope	None	Little or no loose surface contamination - No known locations of fixed contaminations - Internal surfaces of electron microscope contaminated	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
270	Poly Solid Studies	Present in gloveboxes and ventilation duct. - Quantities and location classified	- Little or no loose surface contamination - Known locations of fixed contamination on floors - Contaminated glovebox internals	Floor/Wall/Ceiling materials and piping insulation possible ACM	Potentially present Additional characterization to be performed		Known Materials used in the room plutonium Uranium oils solvents inks trichloroethane methanol freon TF and ethanol
271	Hallway	None	- Little or no loose surface contamination. - Isolated locations of fixed contamination possible	Floor/Wall/Ceiling materials and piping insulation possible ACM	- Potentially present - Additional characterization to be performed		
272	Gas Testing Electron Microscope	None	- Little or no loose surface contamination - Isolated locations of fixed contamination possible - Contaminated glovebox internals	Floor/Wall/Ceiling materials and piping insulation possible ACM	None		

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Building 779 Reconnaissance Level
Characterization Survey Hazard Summary Matrix

Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
273	Office/Storage	None	Little or no loose surface contamination - Isolated locations of fixed contamination possible - Fixed contamination on box of electrical connections	Floor/Wall/Ceiling materials and piping insulation possible ACM	None		
274	Office Storage	None	- Little or no loose surface contamination Isolated locations of fixed contamination possible - Fixed contamination on box of electrical connections.	Floor/Wall/Ceiling materials and piping insulation, possible ACM	None	None	
275	Office Storage	None	- Little or no loose surface contaminations -Isolated locations of fixed contamination possible - Fixed contamination on box of electrical connections	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
277	Office Storage	None	- Little or no loose surface contamination -Isolated locations of fixed contamintaion possible -Fixed contamination on box of electrical connections	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	

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Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
Building 729	Filter Plenum	Present in ventilation duct and filter plenum Quantities and location classfied	- Possible high levels inside filter - Plenum	Floor/Wall/Ceiling materials and piping insulation possible ACM	Possiblity present inside plenum to be confirmed	Possibily present in electrical transformer equipment. To be confirmed	
Building 782	Filter Plenum		- No loose surface contamination on room surfaces - Possible high levels inside filter - Plenum	Floor/Wall/Ceiling materials and piping insulation possible ACM	Possiblity present inside plenum - to be confirmed		
Building 727	Emergency Diesel Generator	None	No Suspected Contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	Possibily present in electrical transformer equipment. To be confirmed	
780	Storage Facility	None	No Suspected Contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
780A	Metal Storage Facility	None	No Suspected Contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
780B	Gas Bottle Storage Facility	None	No Suspected Contamination	Floor/Wall/Ceiling materials and piping insulation, possible ACM	None	None	
782	Filter Plenium		No loose surface contamination on room surfaces - Possible isolated locations of low level fixed contamination Possible high levels inside filter bank.	Floor/Wall/Ceiling materials and piping insulation possible ACM	Possiblity present inside filter bank. To be confirmed	None	

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Room/ Area	Description	PU Holdup	Radiological Contamination	Asbestos	Beryllium	PCBs	Other Hazards/Remarks
783	Cooling Tower Pump House	None	No Suspected Contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
784	Cooling Tower Pump House	None	No Suspected Contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
785	Cooling Tower Pump House	None	No Suspected Contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
786	Cooling Tower and West Chiller	None	No Suspected Contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
787	Cooling Tower and East Chiller	None	No Suspected Contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	
East Dock	Dock	None	No known contamination	Floor/Wall/Ceiling materials and piping insulation possible ACM	None	None	90 day RCRA Unit

GLOSSARY

alpha radiation - The most energetic but least penetrating form of radiation It can be stopped by a sheet of paper and cannot penetrate human skin If an alpha-emitting isotope enters the body, however, through inhalation, on food, or through a cut in the skin, it will cause highly concentrated local damage (See also beta radiation and gamma radiation)

asbestos - Asbestos form, varieties of chrysotile, amosite, aocidolite, anthophyllite, tremolite, and actinolite A strong and incombustible fiber widely used in the past for fireproofing and insulation The small, bouyant fibers are easily inhaled or swallowed, causing a number of serious diseases including asbestosis, a chronic disease of the lungs that makes breathing more and more difficult, cancer, and mesothelioma, a cancer of the membranes that line the chest and abdomen, specific to asbestos exposure

background radiation - The natural radioactivity in the environment Natural radiation consists of cosmic rays, filtered through the atmosphere from outer space, and radiation from the naturally radioactive elements in the earth (primarily uranium, thorium, radium, and potassium) Also known as natural radiation

best available technology (BAT) - Treatment technologies that have been shown through actual use to yield the greatest environmental benefit among competing technologies that are practically available

beta radiation - High-energy electrons (beta particles) emitted from certain radioactive material Can pass through 1 to 2 centimeters of water or human flesh and can be shielded by a thin sheet of aluminum Beta particles are more deeply penetrating than alpha particles but, due to their smaller size, cause less localized damage

characterization - Facility or site sampling, monitoring, and analysis activities to determine the extent and nature of a contamination Characterization provides the basis for acquiring the necessary technical information to develop, screen, analyze, and select appropriate cleanup techniques

contamination - The presence of foreign materials, chemicals, or radioactive substances in the environment (facilities, soil, sediment, water, or air) in significant concentrations

curie - A unit of radioactivity that represents the amount of radioactivity associated with one gram of radium To say that a sample of radioactive material exhibits one curie of radioactivity means that the element is emitting radiation at the rate of $3\ 7 \times 10^{10}$ disintergrations per second Named after Marie Curie, an early nuclear scientist

decay - The process whereby radioactive particles undergo a change from one form, or isotope, to another, releasing radioactive particles and/or energy

deactivation - The process of placing a facility in a safe and stable condition to minimize the long-term cost of a surveillance and maintenance program that is protective of workers, the public, and the environment until decommissioning is complete Actions include the removal of fuel, draining and/or de-energizing of nonessential systems, removal of stored radioactive and hazardous materials and related actions As the bridge between operations and decommissioning, based upon facility-specific considerations and final disposition plans, deactivation can accomplish operations-like activities such as final process runs, and also decontamination activities aimed at placing the facility in a safe and stable condition

decommissioning - Takes place after deactivation and includes surveillance and maintenance, decontamination, and/or dismantlement These actions are taken at the end of the life of the facility to retire it from service with adequate regard for the health and safety of workers and the public and protection of the environment

decontamination - The removal or reduction of radioactive or hazardous contamination from facilities, equipment, or soils by washing, heating, chemical or electrochemical action, mechanical cleaning or other techniques to achieve a stated objective or end condition

dismantlement - The disassembly or demolition and removal of any structure, system, or component during decommissioning and satisfactory interim or long-term disposal of the residue from all or portions of the facility

disposal - Waste emplacement designed to ensure isolation of waste from the biosphere, with no intention of retrieval for the foreseeable future, and that requires deliberate action to regain access to the waste

dose - Quantity of radiation or energy absorbed, measured in rads

dose equivalent - A term used to express the amount of effective radiation received by an individual A dose equivalent considers the type of radiation, the amount of body exposed, and the risk of exposure Measured in rems

friable asbestos - Asbestos, when dry, may be crumbled, pulverized, or reduced to powder by hand pressure and non-friable asbestos containing material, that when damaged, may be crumbled, pulverized, or reduced to powder by hand pressure

gamma rays - Penetrating electromagnetic waves or rays emitted from nuclei during radioactive decay, similar to x-rays Dense materials such as concrete and lead are used to provide shielding against gamma radiation

half-life - The time required for a radioactive substance to lose 50 percent of its activity by decay The half-life of the radioisotope plutonium-239, for example, is about 24,000 years Starting with a pound of plutonium-239, in 24,000 years there will be one-half pound of plutonium-239, in another 24,000 years there will be one-fourth pound, and so on (A pound of material remains, but it gradually becomes a stable element)

hazard - A source of danger (i e , material, energy source, or operation) with the potential to cause illness, injury, or death to personnel or damage to a facility or to the environment (without regard for the likelihood or credibility of accident scenarios or consequence mitigation)

hazard categories - The consequences of unmitigated releases of radioactive or hazardous material as evaluated in accordance with DOE Order 5480 23, Nuclear Safety Analysis Reports, and classified by the following hazard categories

- Hazard Category 1 The hazard analysis shows the potential for significant off site consequences (No Hazard Category 1 facilities are designated at Rocky Flats)
- Hazard Category 2 The hazard analysis shows the potential for significant on site consequences
- Hazard Category 3 The hazard analysis shows the potential for only significant localized consequences

hazardous materials - Any solid, liquid, or gaseous material that is toxic, explosive, flammable, corrosive, or otherwise physically or biologically threatening to health

hazardous waste - A solid waste or combination of solid wastes, that because of quantity, concentration, or physical, chemical, or infectious characteristics, may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness or pose a substantial hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed

isotopes - Atoms of the same element that have equal numbers of protons, but different numbers of neutrons Isotopes of an element have the same atomic number but different atomic mass. For example, uranium-238 and uranium-235

low-level waste - Discarded radioactive material such as rags, construction rubble, glass, etc , that is only slightly or moderately contaminated They pose few health hazards and are usually disposed of by shallow land burial

mixed waste - Contains both radioactive and hazardous components

nuclear facility - A facility whose operations involve radioactive materials in such form and quantity that a significant nuclear hazard potentially exists to the employees or the general public Included are facilities that

(a) produce, process, or store radioactive liquid or solid waste, fissionable materials, or tritium,

(b) conduct separations operations,

(c) conduct irradiated materials inspection, fuel fabrication, decontamination, or recovery operations,

(d) conduct fuel enrichment operations Incidental use of radioactive materials in a facility operation (e g , check sources, radioactive sources, and X-ray machines) does not necessarily require the facility to be included in this definition

natural radiation - Radiation that is always present in the environment from such sources as cosmic rays and radioactive materials in rocks and soil Also known as background radiation

nuclear radiation - Ionizing radiation originating in the nuclei of atoms, alpha, beta, and gamma radiation

nuclear material safeguards categories- As defined in DOE order 5633 3B, "Control and Accountability of Nuclear Materials" and DOE order 5632 1C, "Protection and Control of Safeguards and Security Interests "

Categories as they apply to Decommissioning Projects at RFETS for materials with an attractiveness level D or E are

- Category 1 - Not applicable
- Category 2 - Requires "Q" clearance for access to the protected area (PA) Applies if quantities of Pu or U-233 are in excess of 16 kilograms or quantities of U-235 are in excess of 50 kilograms in the facility
- Category 3 - Requires "L" clearance for access to the PA Applies if quantities of Pu or U-233 are less than 16 kilograms or quantities of U-235 less than 50 kilograms, but not greater than 8 kilograms in the facility
- Category 4 - No security clearance required to enter the area although the area may be locked. Applies if quantities of Pu or U-233 are less than 3 kilograms or quantities of U-235 are less than 8 kilograms

pathways - The means by which contaminants move Possible pathways include air, surface water, groundwater, plants, and animals

Polychlorinated Biphenyl (PCB) - A synthetic, organic chemical once widely used in electrical equipment, specialized hydraulic systems, heat transfer systems, and other industrial products Highly toxic and a suspect carcinogen Any wastes that contain more than 50 parts per million of PCBs are subject to regulation under the Toxic Substances Control Act

plutonium - An artificially produced element that is fissile and radioactive It is created when an atom of uranium-238 captures a slow neutron in its nucleus

radiation - Fast particles and electromagnetic waves emitted from the nucleus of an atom during radioactive disintegration

radioactive - Giving off, or capable of giving off, radiant energy in the form of particles (alpha or beta radiation) or rays (gamma radiation) by the spontaneous disintegration of the nuclei of atoms Radioisotopes of elements lose particles and energy through the process of radioactive decay Elements may decay into different atoms or a different state of the same atom

radioactive waste - A solid, liquid, or gaseous material of negligible economic value that contains radionuclides in excess of threshold quantities except for radioactive material from post-weapons-test activities

radioisotope - An unstable isotope of an element that will eventually undergo radioactive decay (i e , disintegration) Radioisotopes with special properties are produced routinely for use in medical treatment and diagnosis, industrial tracers, and for general research

radiological facility - A facility containing measurable amounts of radioactive materials in quantities less than the thresholds for Hazard Category 3 established in DOE-STD-1027-92 but more than the thresholds established in 40 CFR 302, Appendix B, RQs

radionuclide - A radioactive species of an atom

radon - A radioactive gas produced by the decay of one of the daughters of radium Radon is hazardous in unventilated areas because it can build up to high concentrations and, if inhaled for long periods of time, may cause lung cancer

risk - The quantitative or qualitative expression of possible loss that considers both the probability that a hazard will cause harm and the consequences of that event

risk assessment - The study and estimation of risk from a current or proposed activity Involves estimates of both the probability and consequence of an action

safety analysis - A documented process to (1) provide systematic identification of hazards within a given DOE operation, (2) describe and analyze the adequacy of measures taken to eliminate, control, or mitigate identified hazards; and (3) analyze and evaluate potential accidents and their associated risks For the purposes of this document, the term "analysis" and "assessment" are used interchangeably

safety analysis report (SAR) - A report that documents the adequacy of safety analysis for a nuclear facility to ensure that the facility can be constructed, operated, maintained, shut down, and decommissioned safely and in compliance with applicable laws and regulations.

safety basis - The combination of information relating to the control of hazards at a nuclear facility (including design, engineering analyses, and administrative controls) upon which DOE depends for its conclusion that activities at the facility can be conducted safely

standard industrial hazards - Hazards that are routinely encountered in general industry and for which national consensus codes and/or standards (e g , OSHA, transportation safety, etc) exist to guide safe design and operation without the need for special analysis to define safe design and/or operational parameters Some site SAR hazards assessments refer to these as "typical" industrial hazards or just "industrial hazards "

scoping - In CERCLA, scoping is the initial planning phase of the cleanup process, when requirements are discussed and the projects defined In the NEPA process, scoping relates to public involvement to help identify significant issues early so that efforts can be focused on those areas requiring resolution and to present a balanced environmental impact statement

transuranic (TRU) mixed waste - Radioactive waste containing a concentration of alpha-emitting transuranic nuclides greater than 100 nCi/g and contains non-radioactive hazardous constituents

transuranic (TRU) waste - Waste materials contaminated with isotopes above uranium in the periodic table Transuranic waste is long-lived, but only moderately radioactive Radioactive waste containing a concentration of alpha-emitting transuranic nuclides greater than 100 nCi/g

treatment - Any active that alters the chemical or physical nature of a waste to reduce its toxicity or prepare it for disposal

uranium - The heaviest element found in nature Approximately 997 of every 1000 uranium atoms are uranium-238 The remaining 3 atoms are the fissile uranium-235 The uranium-235 atom splits, or fissions, into lighter elements when its nucleus is struck by a neutron

ACRONYMS

The following is a partial listing of acronyms and abbreviations that are commonly used in the Decommissioning Program

ACBM - Asbestos Coating Building Material

AEA -

ALARA - As Low as Reasonably Achievable

> A standard applied to regulate radiation exposure limits at nuclear facilities The principle takes into account the state of technology, the economics of improvements in relation to benefits to the public health and safety, other societal and socioeconomic considerations, and the utilization of atomic energy in the public interest.

APEN - Air Pollution Emission Notice

ARAR - Applicable or Relevant and Appropriate Requirement

> A requirement that applies or pertains to the handling or disposition of waste at an identified site

ASAP - Accelerated Site Action Project (referred to as the Vision)

ATS - Automatic Transfer Switch.

BAT - Best Available Technology Treatment

> Technologies that have been shown through actual use to yield the greatest environmental benefit among competing technologies that are practically available

BDP -

BOM - Bill of Material

BRCS - Building Radiation Cleanup Equivelant

CA - Contract Administration

CAA - Clean Air Act

CCC - Chemical Constituent Code

CCR - Code of Colorado Regualtions

CDEH -

CDPHE - Colorado Department of Public Health and the Environment

CDTA - Cyclohexanediaminetetraacetic Acid Sodium Salt

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act

A federal law passed in 1980, and modified in 1986 by the Superfund Amendments and Reauthorization Act The Acts created a special tax that goes into a Trust Fund, commonly known as Superfund, to investigate and clean up abandoned or uncontrolled hazardous waste sites.

CFR - Code of Federal Regulations.

COOP - Conduct of Operations Manual.

CWA - Clean Water Act

Controls waste emissions into surface water bodies or publicly owned treatment systems Requires best conventional technology and best available demonstrated controls to limit the impact of the contaminants

D&D - Decontamination and Decommissioning

DCHP - Dicesiumhexachloroplutonate

DF - Decontamination Factors

DOE - U S Department of Energy

DOE/HQ - U S Department of Energy, Headquarters

DOP - Decommissioning Operations Plan

DOR - Direct Oxide Reduction

DP - Defense Program

DPP - Decommissioning Program Plan

DQO - Data Quality Objectives

Statements that specify the data needed to support decisions regarding remedial response activities

E/C/D - Engineering/Construction/Decommissioning

EA - Environmental Assessment

EB - Electron Beam

EDE - Effective Dose Equivilant

EIS - Environmental Impact Statement

RM-60 -

EMCC - Emergency Control Centers

EMD -

ENV -

EO - Engineering Orders

EPA - U S Environmental Protection Agency

A federal agency that develops standards for acceptable limits of water, air, and environmental contaminants, and oversees adherence to those standards Region VIII of the EPA will have oversight responsibilities for RFETS

EPD -

ER - Environmental Restoration

The process of environmental cleanup designed to ensure that risks to the environment and to human health and safety from waste sites are either eliminated or reduced to prescribed, safe levels

ESCA - Electron Spectroscopy for Chemical Analysis

FCN - Field Change Notices

FCR - Field Change Requests

FFCA - Federal Facility Compliance Agreement

FONSI - Finding of no significant importance.

FR -

FREON - TF

FY - Fiscal Year

GB - GloveBox

HASP - Health and Safety Plan

Prepared during the scoping phase of a Superfund remediation, this plan describes the measures that will be taken to ensure health and safety at the site

HCA -

HCL -

HEPA - High Efficiency Particulate

HRM -

HSP -

HVAC - Heating, Ventilating, and Air Conditioning

IAEA - International Atomic Energy Agency.

IAG - Interagency Agreement

IHSS -

IM/IRA - Interim Measures/Interim Remedial Action.

ISCO -

IWCP - Integrated Work Control Package.

JHA - Job Hazard Analysis

JSA - Job Safety Analysis

LDR -

LLM - Low Level Mixed

LLW - Low-Level Waste

Typically, discarded radioactive material such as rags, construction rubble, glass, etc , that is only slightly or moderately contaminated Most such waste is short-lived and of low radioactivity

LRA - Lead Regulatory Agency.

MAA - Material Access Area

MAAL - Maxium Allowed Asbestos Level

MCC - Motor Control Centers

MCL -

MSE - Molten Slat Extraction.

NAAQS - National Ambient Air Quality Standards.

NCP -

NCR - Nonconformance Reporting

NDA - Nondestructive Assay

NEPA - National Environmental Policy Act

Requires federal agencies to consider environmental factors when making decisions and to evaluate environmental impacts prior to making major federal actions Environmental assessments and environmental impact statements are NEPA documents

NPL - National Priorities List

The Environmental Protection Agency's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial response under CERCLA Based primarily on the score a site receives on the Hazard Ranking System

NRC - U S Nuclear Regulatory Commission

Regulates nuclear safety aspects of nuclear facilities

NRWOLS - Non-Routine Waste Organization Logs

NUREG -

OSHA - Occupational Safety and Health Administration

OSWER -

OU - Operable Unit

Term for each of a number of separate activities undertaken as part of a Superfund site cleanup A typical operable unit would be removing drums and tanks from the surface of a site

PAM - Proposed Action Memorandum

The decision document that describes an accelerated cleanup activity which DOE expects can be completed during a six-month period

PCB - Polychlorinated Biphenyl

A synthetic, organic chemical once widely used in electrical equipment, specialized hydraulic systems, heat transfer systems, and other industrial products. Highly toxic and carcinogenic. Any hazardous wastes that contain more than 50 parts per million of PCBs are subject to regulation under the Toxic Substances Control Act

PM - Project Manager

PNL - Pacific Northwest Laboratories

PPE - Personal Protective Equipment.

PRP - Potentially Responsible Party

An individual(s) or company(ies) (such as owners, operators, transporters, or generators) potentially responsible for, or contributing to, the contamination problems at a Superfund site Whenever possible, EPA requires PRPs, through administrative and legal actions, to clean up hazardous waste sites they have contaminated

PSZ - Protective Zone

PU - Plutonium.

PU&D - Property Utilization and Disposal.

QA - Quality Assurance

QAPP - Quality Assurance Project Plan

A plan that describes the protocols necessary to achieve the data quality objectives defined for a remedial investigation

QCR - Quality Conditioning Reporting

R&D - Reserach and Development

RBA -

RC - Response Center

RCA - Radiological Controled Area

RCM - Radiological Controls Manaual

RCRA - Resource Conservation and Recovery Act

A federal law that established a regulatory system to track hazardous substances from the time of generation to disposal The law requires safe and secure procedures to be used in treating, transporting, storing and disposing of hazardous substances

RCSR -

RCT - Radiation Control Technician.

RE - Radiation Engineers

RESRAD -

RFCA - Rocky Flats Cleanup Agreement

The legally binding agreement between the DOE, the EPA, and the CDPHE to accomplish the cleanup of radioactive and other hazardous substances contamination at RFETS

RFETS - Rocky Flats Environmental Technology Site

RLCR - Reconnaissance Level Characterization Report

RMRS - Rocky Mountain Remediation Services

RMS -

ROD - Record of Decision

RPOSO - Radiation Protection snf Occupational Safety Officer

RRA - Rubber Reclaimers Association.

RTT - Residue Treatment Technology

RWP - Radiation Work Package

S&M -

SAAM - Selective Alpha Air Monitor System

SARA - Superfund Amendments and Reauthorization Act

SDAA -

SDWA - Safe Drinking Water Act

A law that establishes regulations designed to protect drinking water resources. Incorporated both into RCRA and CERCLA under provisions dealing with groundwater protection

SEIS - Sitewide Environmental Impact Statement

Document which serves as an action-forcing device to insure that the policies and goals defined in NEPA are included in the ongoing restoration programs Provides full discussions of significant environmental impacts and informs the public of alternatives which would avoid or minimize adverse impacts

SEM - Scanning Electron Microscopy

SNM - Special Nuclear Material

SRA - Support Regulatory Agencies

TBC - To Be Considered

TEM - Transmission Electron Microscope

TIRA - Temperature Indicating Recording Enuciating System.

TRM - Training Reference Manual.

TRU - Transuranic Waste

TSCA - Toxic Substances Control Act

A law which gave the EPA the authority to regulate the manufacture, distribution, use, and disposal of chemical substances Special emphasis was placed on the regulation of PCBs, or polychlorinated biphenyls (see PCB)

U - Uranium

UG - Micrograms

UPS - Uninterrputed Emergency Power Supply

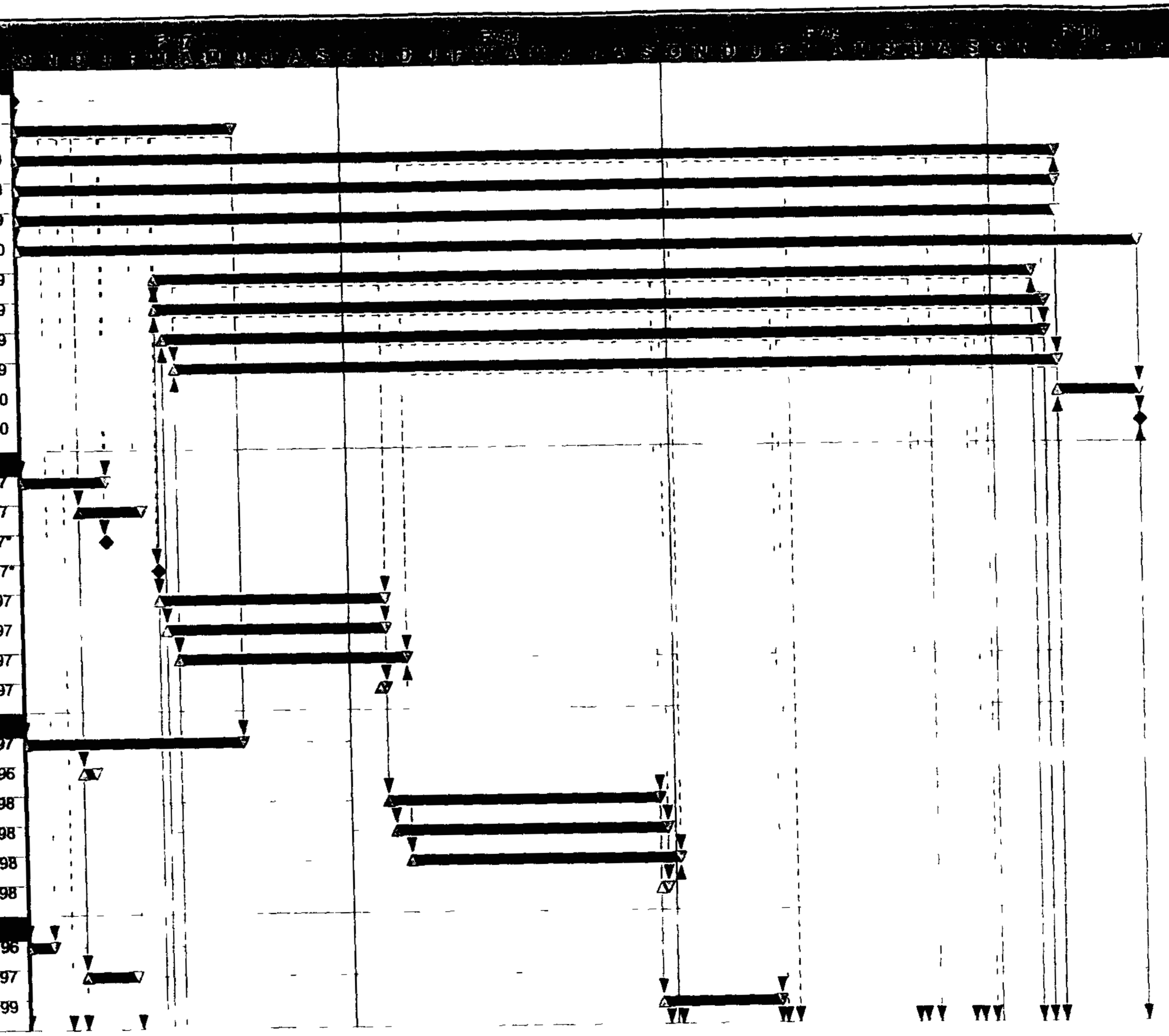
USR -

UST - Underground Storage Tank

WRT - Waste Residue Traveler.

WSRIC - Waste Stream and Residue Identification and Characterization

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
AEKTBHE000	Dummy activity for hammocks	0	01OCT96	
AEKTBHE320	Initial Characterization Areas 1-6	152*	01OCT96	02JUN97
AEKTBHE100	Decommissioning	728*	01OCT96	13DEC99
AEKTBHE300	Characterization	728*	01OCT96	13DEC99
AEKTBHE400	Site Preparation	728*	01OCT96	13DEC99
AEKTBHE200	Planning & Engineering	788*	01OCT96	16MAR00
AEKTBHE600	Dismantlement	619*	04MAR97	17NOV99
AEKTBHE340	Continuing Characterization	624*	04MAR97	29NOV99
AEKTBHE500	Decontamination	619*	12MAR97	29NOV99
AEKTBHE360	Final Characterization	619	26MAR97	13DEC99
AEKTBHE700	Building Demo	60	14DEC99	16MAR00
AEKBHE001	Finish project	0		16MAR00
AEKTBHEF00	B779 Area 1 Initial Physical Deactivation	64	01OCT96	03JAN97
AE1423435	Bldg 779 Area 1 SNM Cleanout	49	05DEC96*	13FEB97
AEKTBHEF10	Initial Characterization Report	0		03JAN97*
AE1443110	Bldg 779 Decommissioning Opns Plan Approval	0		03MAR97*
AEKTBG2730	Bldg 779 Area 1 Process Equipment Removal	160	04MAR97	11NOV97
AEKTBF2710	Bldg 779 Area 1 Decontamination	155	12MAR97	11NOV97
AEKTBG3000	Bldg 779 Area 1 Final Survey	160	26MAR97	05DEC97
AEKTBG2900	Bldg 779 Area 1 Utility Removal	5	05NOV97	11NOV97
AEKTBHEG00	B779 Area 2 Initial Physical Deactivation	169	01OCT96	02JUN97
AE1423440	Bldg 779 Area 2 SNM Cleanout	12	05DEC96	20DEC96
AEKTBF2732	Bldg 779 Area 2 Process Equipment Removal	190	12NOV97	14SEP98
AEKTBG2720	Bldg 779 Area 2 Decontamination	190	20NOV97	22SEP98
AEKTBG3010	Bldg 779 Area 2 Final Survey	190	08DEC97	06OCT98
AEKTBG2910	Bldg 779 Area 2 Utility Removal	5	15SEP98	22SEP98
AEKTBHEH00	B779 Area 3 Initial Physical Deactivation	21	01OCT96	29OCT96
AE1423442	Bldg 779 Area 3 SNM Cleanout	40	05DEC96	31JAN97
AEKTBG2734	Bldg 779 Area 3 Process Equipment Removal	81	15SEP98	25JAN99



Project Start	01JAN93
Project Finish	16MAR00
Data Date	01OCT96
Plot Date	18DEC96

Early Bar
Progress Bar
Critical Activity

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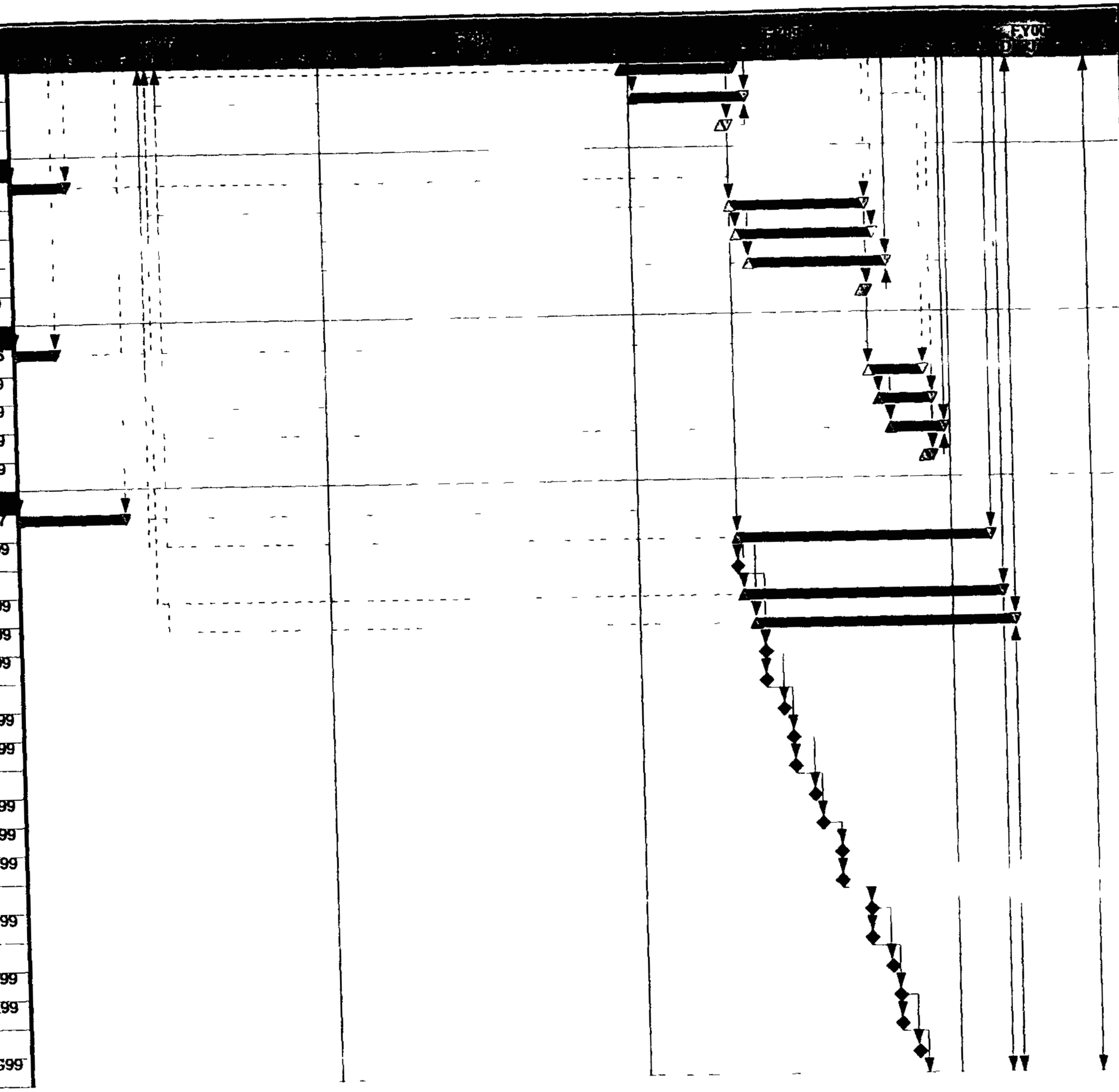
ISB1

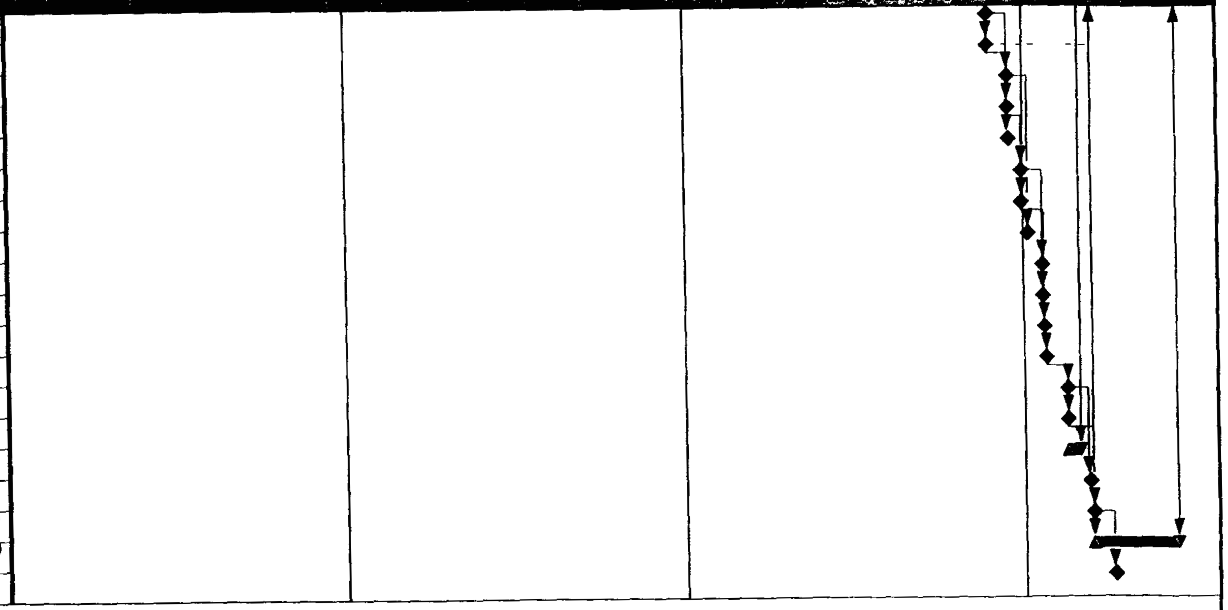
Sheet 1 of 3

RMRS
CLUSTER 779 REMOVAL
Level III Schedule

AEKTBG2723	Bldg 779 Area 3 Decontamination	81	23SEP98	01FEB99
AEKTBG3020	Bldg 779 Area 3 Final Survey	81	07OCT98	15FEB99
AEKTBG2920	Bldg 779 Area 3 Utility Removal	5	18JAN99	25JAN99
AEKTBHEK00	B779 Area 4 Initial Physical Deactivation	44	01OCT96	04DEC96
AEKTBG2736	Bldg 779 Area 4 Process Equipment Removal	100	26JAN99	30JUN99
AEKTBG2725	Bldg 779 Area 4 Decontamination	100	02FEB99	08JUL99
AEKTBG3030	Bldg 779 Area 4 Final Survey	100	16FEB99	22JUL99
AEKTBG2930	Bldg 779 Area 4 Utility Removal	5	23JUN99	30JUN99
AEKTBHEM00	B779 Area 5 Initial Physical Deactivation	35	01OCT96	18NOV96
AEKTBG2738	Bldg 779 Area 5 Process Equipment Removal	40	01JUL99	01SEP99
AEKTBG2727	Bldg 779 Area 5 Decontamination	40	12JUL99	10SEP99
AEKTBG3040	Bldg 779 Area 5 Final Survey	40	26JUL99	24SEP99
AEKTBG2940	Bldg 779 Area 5 Utility Removal	5	02SEP99	10SEP99
AEKTBHEN00	B779 Area 6 Initial Physical Deactivation	87	01OCT96	05FEB97
AEKTBG2740	Bldg 779 Area 6 Process Equipment Removal	188	26JAN99	17NOV99
AEKTBM2710	B727 Start Equip Removal	0	26JAN99	
AEKTBG2729	Bldg 779 Area 6 Decontamination	188	02FEB99	29NOV99
AEKTBG3050	Bldg 779 Area 6 Final Survey	188	16FEB99	13DEC99
AEKTBM2820	B727 Finish Equip Removal	0		24FEB99
AEKTBM2720	B729 Start Equip Removal	0	25FEB99	
AEKTBG3051	B727 Final Survey	0		17MAR99
AEKTBM2830	B729 Finish Equip Removal	0		26MAR99
AEKTBM2730	B780 Start Equip Removal	0	29MAR99	
AEKTBG3052	B729 Final Survey	0		19APR99
AEKTBM2840	B780 Finish Equip Removal	0		27APR99
AEKTBG3053	B780 Final Survey	0		19MAY99
AEKTBM2740	B780A Start Equip Removal	0	20MAY99	
AEKTBM2850	B780A Finish Equip Removal	0		21JUN99
AEKTBM2750	B780B Start Equip Removal	0	22JUN99	
AEKTBG3054	B780A Final Survey	0		14JUL99
AEKTBM2860	B780B Finish Equip Removal	0		22JUL99
AEKTBM2760	B782 Start Equip Removal	0	26JUL99	
AEKTBG3055	B780B Final Survey	0		13AUG99



AEKTBM2870	B782 Finish Equip Removal	0		24AUG99
AEKTBM2770	B783 Start Equip Removal	0	25AUG99	
AEKTBM2880	B783 Finish Equip Removal	0		14SEP99
AEKTBM2780	B784 Start Equip Removal	0	15SEP99	
AEKTBG3056	B782 Final Survey	0		15SEP99
AEKTBM2890	B784 Finish Equip Removal	0		29SEP99
AEKTBM2790	B785 Start Equip Removal	0	30SEP99	
AEKTBG3057	B783 Final Survey	0		06OCT99
AEKTBG3058	B784 Final Survey	0		21OCT99
AEKTBG3059	B785 Final Survey	0		21OCT99
AEKTBM2900	B785 Finish Equip Removal	0		22OCT99
AEKTBM2800	B786 Start Equip Removal	0	25OCT99	
AEKTBM2910	B786 Finish Equip Removal	0		16NOV99
AEKTBM2810	B787 Start Equip Removal	0	17NOV99	
AEKTBG2950	Bldg 779 Area 6 Utility Removal	5	18NOV99	29NOV99
AEKTBG3060	B786 Final Survey	0		09DEC99
AEKTBM2920	B787 Finish Equip Removal	0		13DEC99
AEKTBR2960	Support Building Demos	60	14DEC99	16MAR00
AEKTBG3061	B787 Final Survey	0		05JAN00



Review Comment Sheet
Ned Hutchinson - Comments to 12/18/96 Draft DOP

Comment:

Pg 19 section 3 1 1 3 No 779-2 shown in figure 1 2

Disposition

Corrected

Comment:

Pg 21 section 3 1 2 4 2nd sentence confusing

Disposition:

Corrected

Comment

Pg 23 GB-953 "epoxied on"?

Disposition·

This is a correct statement

Comment

Pg 30 G B 230 "pigtailed bag of trash"?

Disposition

This is a correct statement

Comment

Pg 41 section 3 2 2 Why IWCP decommissioning? How does IWCP fit with privatization?

Disposition

The IWCP is the tool used to accomplish work at RFETS The IWCP currently is the tool used by subcontractors to accomplish work at RFETS If another method is to be used, the contract for privatization needs to identify all the elements necessary to safely accomplish the work Presently, the RFETS infrastructure does not identify another process to get work done

Comment

Pg 42 section 3 2 3 Line 1 “will” should be “may”

Disposition

“Will” is appropriate in that the indicated steps are planned to be used The word “typical” earlier in the sentence would allow a different but similar set of steps to be used

Comment

Pg 43 Paragraph starts out “Prior to ”, 3 rd Line should “the containment “ read “a containment”

Disposition

Changed to “a containment”

Comment

Pg 50 section 5 1 Why use draft regs ? What about after approval?

Disposition·

This section has been revised The elements of the draft regulations are being followed as a best management practice It is not intended that any requirements be retrofitted

Comment:

Pg 50 section 5 2 Why not fit to 10 CFR 834?

Disposition

The requirements of 10 CFR 834 are being followed

Comment.

Pg 52 Section 6 0 2nd line “operting”? 4th paragraph 3 rd line “chagne”? 4th Paragraph Line 6 “questio”? 4th Paragraph last line “wherer”?

Disposition

Corrected

Comment

Pg 53 section 6 2 “Autible”? 2nd Line “environmental”?

Disposition

Corrected

Comment.

Pg 54 “dictatd”?

Disposition

Corrected

Comment·

Pg 55 “Revisioned”?

Disposition

Corrected

Comment:

Pg 62 section 7 7 1 “but we are not limited to the following” How can we plan our work if I don’t know what the rules are?

Disposition

Section 7 7 1 has been revised

Comment

Pg 64 section 8 1 says $\geq$ nCi/gm and section 8 2 says $\leq$ 100 nCi/gm, How can both be equal to 100?

Disposition·

Corrected

Comment

Pg 71 section 9 2 RFCA Paragraph first paragraph last line “safe environmental status”? Does this mean we are currently unsafe?

Disposition

Clarified

Comment

Pg 72 section 9 3 last line on page why IAG when RFCA has been referred to ?

Disposition.

Sentence is deleted

Comment.

Pg 85 section 10 1 first line “task”?

Disposition

Clarified

Comment.

Pg 88 section 10 3 5 Why IWCP?

Disposition

The IWCP process is currently the mechanism used at RFETS to control and accomplish work

Comment·

Pg 91 section 11 0 facility security is this the best we can do? Why not new fencing to restrict uncleared access?

Disposition·

Section 11 describes the current requirements A new fence and different access restriction could be pursued

Comment.

Pg 93 I don't understand figure 1 2-2 at all

Disposition.

Figure 1 2-2 has been corrected

Comment

Pg 120 Effects of a UPS failure 1 2 13 3 says UPS is non functional, What is going on here?

Disposition

Clarified

Comment

Pg 131 section 1 3 2nd line "E g "?

Disposition

Corrected

Comment

Pg 128 Chemical decon probably not used Is this statement OK with privatization? Secondary choice 3rd sentence regarding "reuse " What is our position?

Disposition

The use of chemical decontamination was not precluded entirely Currently the position is as stated

Comment

Pg 129 Table "Oxidation"? Change has been at N reactor to "was"

Disposition

Changed

Review Comment Sheet
Melody Bell - Comments to 12/18/96 Draft 779 DOP

Comment·

1 It appears to me that a great deal of the DOP contents could be put into the DPP For example, the site history, organizational structure, facility characterization protocols, Quality Assurance, Appendix 2, etc could be moved into the DPP Only specifics to Building 779 should go into the DOP References could be made to the DPP for the above items, thus making the DOP much smaller and more manageable

Disposition

Present guidance is to design the 779 Cluster DOP to "stand alone" with succeeding DOPs referencing the DPP

Comment·

2 There is no mention in the DOP about a HASP for D&D I've heard there will be a site HASP (currently exists), a D&D HASP, and a DOP HASP I have yet to see either the D&D HASP or a DOP HASP Perhaps the D&D HASP should be included in the DPP and the specific DOP HASP's in the DOP Regardless of where the HASPs will reside, it appears that RMRS is not aware of a D&D HASP (see section 7 1 4)

Disposition

The Site Health and Safety Practices Manual is referenced in the 9/25/97 revision to the 779 Cluster DOP as well as a project specific HASP

Comment

3 The DOP was obviously prepared by RMRS and they frequently reference their name throughout the document I would prefer that the DOP use Integrated Contract Management, ICM, Kaiser Hill Team, or something more generic than one specific subcontractor

Disposition

The document has been sanitized to reflect only the Integrated Contract Management

Comment.

4 Blank spots in Table 8 1 should be filled in with "N/A", "0", or some other appropriate filler

Disposition

This issue has been corrected

Comment

5 Here is my biggest concern and comment FINAL SURVEY! There needs to be more detail and direction! I cannot over emphasis the importance of the final survey and its associated documentation When D&D is complete and the buildings are demolished, the most critical piece of evidence that will prove the job was done correctly and that there is no further risk to the public and environment is the final survey It is still so far off in the future for most of us to seriously consider, but in the end, the final survey will become more and more important The public and other regulators will become very interested in the final survey and the documented results This is why RMRS and Kaiser need to seriously evaluate the final survey now

Based on all the RFETS D&D documents I've reviewed to date, there is very little written about the final survey Section 5 1 in the DOP briefly discusses final survey techniques and methodologies Section 5 1 also states that the final "survey techniques and methodologies described in NUREG 5849, Draft NUREG 1505, and Draft NUREG 1506 will be used to develop and implement the Final Decommissioning Survey " Having experienced trying to use these regulations at Fort Saint Vrain, this is a bold statement I doubt that RMRS will want to follow every detail in these regulations because there are better ways to conduct the final survey Dick Sexton (RMRS) will know what I'm talking about here

After reviewing the current KH Radiological Operation Instructions, I don't believe that the current infrastructure will support conducting an appropriate final survey I will not be satisfied with RMRS' final survey program until I see 1) a Final Survey Plan detailing who, what, when, where and how final survey will be performed and documented, 2) specific final survey procedures detailing the requirements from the Final Survey Plan in more details For example, at Fort Saint Vrain we had procedures for background determination, survey package instruction preparation, performance of surveys of structures, liquids, soil etc , system piping surveys, gridding and marking measurement locations, quality assurance surveys, isolation and controls of final surveyed areas, final survey data analysis, and final report generation An finally, 3) specific final survey training should be developed for D&D workers, RCTs Radiological Engineers, and Management Applicable items in the Final Survey Plan and procedures needs to be covered for each group above If you wish to get an idea about what I'm proposing, I can provide you with the Fort Saint Vrain Final Survey Plan and procedures for your review

I have brought up these final survey concerns several times at various D&D meetings, yet, I have seen little or no response from Kaiser Hill or RMRS I hate to keep bringing this issue up and sounding like a broken record, but, I believe DOE needs to take a strong stance on this issue As we move further into D&D and closer to demolishing buildings, you will see that final survey will become a big issue Kaiser Hill and RMRS need to start thinking about final survey now and develop their plans and procedures before they get too far into D&D DOE should not let any final surveys begin until the above mentioned items are in place

Resolution

Final survey plans used in the decommissioning of the 980 and 690 Clusters integrated and tested some of the lessons learned, as appropriate, from the decommissioning of Fort St Vrain These lessons learned will also be incorporated into the final survey plan/implementation for the 779 Cluster, personnel responsible for planning and performing verification surveys at Fort St Vrain are supporting the 779 Cluster Decommissioning Project

Final survey concerns were indeed noted by RMRS during 779 Cluster decommissioning discussions, but due to ongoing negotiations related to privatization of the project, no earlier actions were taken RMRS project personnel believe that testing the Fort St Vrain final survey process on two decommissioning projects to date, and integrating personnel who prepared the final survey plans for both projects, demonstrates our intent to address customer concerns In addition, the project anticipates that DOE will exercise third party verification of the final survey process to ensure adequacy of the final verification process as performed

The transition from an operating facility to a facility undergoing decommissioning is not going to be an overnight event at RFETS The requirements placed on the Site by regulators /stakeholders, and the progress oriented philosophy of the companies performing decommissioning activities at RFETS, have resulted in a comprehensive final survey program based on an ongoing/lessons learned process Final survey plans are based on the draft MARSSIM and NUREG CR/5849 and have been prepared, approved and utilized for the final survey of the 980 and 690 Cluster projects These survey plans were prepared and reviewed by radiological engineers knowledgeable in the final verification survey process The final surveys for these projects were a success, with lessons learned in the process The closeout reports for these projects reflect this success This is a step in the right direction

Review Comment Sheet
Mark C. Brooks ESH&Q - Comments to 12/18/96 Draft DOP

Comment

General Since this DOP is facility specific, procedures that are being used to implement programs must be referenced

Disposition

The DOP is facility specific but the implementing procedures, except IWCPs, are not facility specific

Comment

General Individuals responsible for functions on the org chart should be identified

Disposition:

Names were not added to the org chart as the personnel can change but the position and responsibilities should remain the same

Comment:

General In order to characterize materials for the purpose of disposal, some sampling scheme or plan must be devised to ensure that the appropriate samples are taken This applies to rads, RCRA or other wastes If equipment that is removed is to be disposed of as a SC than characterization must be done with that in mind

Disposition.

There are existing procedures which provide this information (i e 1-C75-HWRM-03)

Comment

General Records must be handled in accordance 1-78-ER-ARPOOL, CERCLA Administrative Records Program

Disposition

No response necessary

Comment

General Chain of custody is not addressed anywhere in this document

Disposition·

Reference to chain of custody controls have been added The *specific requirement* to complete the chain of custody is in the sampling procedure and part of the samplers training

Comment:

General How is this document integrated with the DPP, RLCS? And any RSOP?

Disposition.

Per RFCA, the DPP is the program document which explains how all decommissioning is to be completed Per RFCA, the RLCR will provide the information necessary to determine if a DOP is required

Comment

General DQOs must be developed in accordance with EPA QA/G-4

Disposition:

It is a good management practice to use elements of the DQO process where they make sense and they apply Elements of the DQO process are being used in the 779 Cluster decommissioning as stated in the DOP and supporting documents It is not correct to make a blanket statement that the EPA QA/G-4 procedure must be used EPA QA/G-4 identifies when it is applicable, states who should use it Please review that section

Comment

General As a CERCLA removal action a project specific quality assurance plan must be written

Disposition

The RMRS QA Plan will be applied to the project

Comment:

Section 8 8 Are all of the decommissioning waste streams for 779 addressed here?

Disposition:

In general terms all the waste streams are addressed in Section 8 8 The specific waste streams are identified in the B779 WSRIC

Comment:

General How can 779 work be started without having the appropriate levels of documents in place, i e DPP, DOP, RLCS, IWCP, etc

Disposition:

No decommissioning work (except planning and characterization activities) has started The planning and characterization activities need to be completed to develop and get the RLCR, DOP, WMP, HASP and IWCPs approved

Review Comment Sheet
Ricky Carr - Comments to 12/18/96 Draft DOP

Comment.

Page 6, Section 1 2 1 Controls do not ensure worker safety They provide the framework for minimizing the risk from hazards

Disposition:

Noted and corrected

Comment.

Page 11, Section 2 1 The organization chart shows the Rad protection and occupational safety officer reporting to the ESH & Q director This director does not have rad protection responsibilities under current RMRS organization

Disposition·

Corrected

Comment:

Page 12, Section 2 1 2 See previous comment This position (as described) and associated responsibilities is not consistent with current RMRS organization Rad Protection/Occupational Safety is not responsible for ensuring compliance with rad and occupational safety requirements Line management (Project Manager) is responsible for ensuring compliance with requirements safety and rad protection provides technical assistance, monitoring and verifies compliance

Disposition

Corrected

Comment·

Page 19, Section 3 1 1 2 1 "Standard shop practices, monthly safety inspections, and trained operating personnel provided as safe working environment" Delete this sentence, it's presumptuous and possibly incorrect

Disposition

Deleted

Comment

Page 20, Section 3 1 1 3 Last sentence refers to hazardous materials some of the substrate material are also hazardous Also define small quantities

Disposition:

Quantities will be defined in the waste management plan

Comment.

Page 21, Section 3 1 2 4 “appreciable” amounts of Pu? Define!

Disposition

Corrected

Comment

Page 22, Section 3 1 2 7 Do the wall storage cabinets contain hazardous chemicals that will be dealt with during the decommissioning?

Disposition

Chemicals will be addressed as a deactivation activity

Comment:

Page 25, Section 3 1 2 14 Define extremely low levels of contamination

Disposition:

Clarified

Comment·

Page 41, Section 3 2 2 Industrial Health and Safety should be Occupational Safety and Industrial Hygiene

Disposition

Corrected

Comment.

Page 42, Section 3 2 3 Asbestos abatement must (29 CFR 1926 1101) be performed prior to any demolition

Disposition

Corrected

Comment:

Page 51, Section 5 4 Delete references to EPA and NIOSH (not applicable) Delete reference to clearance standards for asbestos as they are not applicable at RFETS

Disposition.

Noted

Comment:

Page 58, Section 7 1 2 Delete policy section, not applicable for this document

Disposition·

Deleted

Comment

Page 59, Section 7 1 4 DOE orders require adherence to all the OSHA standards (as applicable) The second paragraph is ambiguous towards this requirement

Disposition

Corrected

Comment:

Page 59, Section 7 1 5 JSA should be prepared with the assistance from the workers

Disposition

Crafts and workers will be involved in this process

Comment

Page 59, Section 7 2 Industrial safety should be "Occupational Safety "

Disposition

Corrected

Comment

Page 59, Section 7 2 1 No reference is made to a project-specific health and safety plan which is required by 29 CFR 1926 65 (the project falls under CERCLA)

The reference to 1910/1926 applicability is incorrect Some of the areas listed are 1 H issues/not safety

Disposition

Corrected

Comment

Page 60, Section 7 3 This section does not adequately address the drivers and associated requirements for Toxic and Hazardous substances, (i e Toxic chemical control)

Disposition

Corrected

Comment·

Page 61, Section 7 4 1 The statement regarding PPE for "mixed hazards" should read 1 H and Rad Control will work together to determine the appropriate PPE to protect against "mixed hazards "

Disposition.

Corrected

Comment.

Page 61, Section 7 5 1 This section states that a Health & Safety Plan will be written/implemented, then discusses components of a Health & Safety Program You are mixing "apples & oranges "

Disposition·

Clarified

Comment.

Page 62, Section 7 6 1 This section does not address RMRS requirements for Emergency/Injury/notification/reporting/investigation

Disposition·

This will be addressed in the project-specific health and safety plan

Comment·

Page 70, Section 7 0 This section is "weak", and does not specifically identify how health and safety will be managed, the plans/procedures to be written/implemented, and who is responsible? I suggest this entire section be rewritten

Disposition

Corrected

Comment·

Page 79, Table 9 1 Colorado requirements for asbestos fails to account that the site is considered to be a non-public access area for implementation of Reg 8 The site Air Monitoring Program probably does not address asbestos monitoring

Disposition

Asbestos related work will be performed in accordance with Reg 8

Comment:

Page 80, Table 9 1 OSHA - "Implemented in the Health and Safety Manual for Decommissioning" what document is this?

Disposition

Corrected

Comment

Page 48, Section 4 4 Asbestos characterization must be performed in accordance with 29 CFR 1926 1101 (k)(5) This section is not entirely consistent with those requirements

Disposition

Corrected

Comment

Page 49, Section 4 5 & 4 6 These sections are vague and fail to address the objectives of performing the characterizations

Disposition

Clarified

Comment

Page 51, Section 5 3 There has been a recommendation to establish a release limit of 9 ugl/ft^2 of Be for release of equipment to the public The stated action level of 25 ugl/ft^2 is for protection of workers and implementation of Beryllium related controls training, medical monitoring)

Disposition

The 25 ugl/ft^2 level for Be is a housekeeping limit The release limit is currently being revisited by KH and DOE

Review Comment Sheet
Jeff Ciocco, EM-45 - Comments to 12/18/96 Draft 779 DOP

Comment

The DOP does not address deactivation end-points and how the end points relate to the decommissioning process

Disposition

RFCA, DPP & DPMP describe the relationship between the deactivation and decommissioning programs Section 1 0 has been revised to identify the deactivation/decommissioning relationship and the significance of the deactivation end points

Comment

The DOP does not identify ~~the hie~~rarchy of decommissioning documents

Disposition

A Figure has been added to Section 1 0 to describe the interrelationships and hierarchy of the documents that support the 779 Cluster Decommissioning Project

Comment

The DOP does not include a summary of alternatives nor selection of the preferred alternative

Disposition

Alternatives are described in Section 9 4 of the 9/25/97 DOP

Comment

Include cost, schedule and work breakdown structure information

Disposition

An estimated total project cost and summary schedule were provided to DOE The work breakdown structure details consist of several hundred pages and would probably lead to more confusion than clarification if it was included for public review

Comment

Include summary of proposed alternatives and recommended selection (Satisfy CERCLA Engineering Evaluation/Cost assessment requirement)

Disposition

See Answer to question 3

Comment:

Prepare one page "Fact Sheet" that details contents of the Decommissioning Operations Plan (DOP) to accompany the DOP when the draft is submitted to Regulators

Disposition:

Section 1 of the DOP contains a summary of each section contained in the DOP

Comment

The DOP did not adequately address the technical cost and schedule baselines

Disposition·

The cost and schedule have a direct relationship to the projects funding level over time and the decommissioning approach Both of these parameters are in flux and potentially could stay in flux Therefore, the schedule and total project costs provided are felt to be adequate

Comment:

Include a discussion on deactivation end-points and the transition process (EM-60 to EM-40 including documentation needed for acceptance)

Disposition

The EM-60 to EM-40 transition is outside the scope of a DOP The DPP may need to be address this subject

Comment·

Include a document hierarchy (Decommissioning Program Plan (DPP), DOP, Integrated Work Control Packages (IWCP), Decommissioning Project Plan, etc)

Disposition.

The discussion of these documents, their hierarchy, and interrelationship is contained in the DPP

Comment

Develop an informational training "Workshop" to educate "stakeholders" and Regulators to the working of the decommissioning process at the Rocky Flats Environmental Technology Site, perhaps as part of the public meeting process

Disposition:

Good suggestion

Comment

Run spell check and format check

Disposition·

Completed spell check

Comment

Revise table of contents to reflect exact section titles and page numbers

Disposition

Changed as suggested

Comment

Change "CERCLA interim status removal process" to CERCLA non-time critical removal action

Disposition:

Changed

Comment·

What other decommissioning documents will be prepared (e g , Decommissioning Project Plan, Work Authorization Document, Integrated Work Control Packages, etc)

Disposition:

A discussion of what documents are to be prepared is included in the DPP while project specific documents are identified in the DOP

Comment

If this document provides only administrative structure, will a Decommissioning Project Plan be written to establish the initial technical, schedule, and cost baseline for the project?

Disposition:

This paragraph has been deleted The DOP is the project plan The detailed schedule and cost baseline is not included to eliminate the necessity for public re-review each time the project schedule and funding are changed

Comment

The Section 5 description is unclear as written

Disposition·

The Section 5 description has been re-written

Comment

Add a statement indicating that all rooms in Bldg 779 are potentially radiologically contaminated and may have been used to store or use RCRA hazardous materials

Disposition

Sections 3 and 4 of the revised 779 Cluster DOP provide an overview of the facility characterization Further detail regarding facility characterization is contained in the 779 Cluster Reconnaissance Level Characterization Plan and Report Process knowledge and available survey data were used to identify radiologically contaminated and potentially radiologically contaminated areas rather than assuming all rooms are contaminated Prior to demolition, sampling of painted surfaces and additional surveys will be performed to ensure that "cleanup criteria", as identified in RFCA , are met

Comment·

Reference Appendix 3 for Radiological Contamination information

Disposition:

Added reference to Appendix 3

Comment

Ensure that each room identified has a statement indicating its radiological or hazardous condition, (Good example-Pg 31/3 1 2 31) Adding the statement recommended by comment #6 may eliminate this need)

Disposition

Appendix 3 and Section 4 were referenced in paragraph 3 1 2 to identify sections within the 779 Cluster Decommissioning DOP where characterization information is provided

Comment

"As discussed later " Indicate in what section of the document

Disposition

Reference to paragraph 3 2 2 was added

Comment:

Remove Appendix 2 referencing the Decommissioning Handbook

Disposition:

Appendix 2 was left in the DOP as it helps narrow the review of the reader to those decontamination techniques which are actually envisioned for potential use

Comment

Reference is made to "attached schedule" Is the schedule an Appendix?

Disposition

Revised the schedule reference to state the schedule is Attachment 1

Comment

Reference Appendix 3

Disposition

Added reference to Appendix 3

Comment

Consider using a Basis of Operations (BIO) concept to document safety authorization basis during deactivation and decommissioning

Disposition:

The BIO concept will be evaluated

Comment

Change "PUD" to PU&D

Disposition:

Changed

Comment·

Include a general statement that Rocky Flats was placed on the NPL in 1989

Disposition:

Added a statement to indicate that RFETS was put on the NPL in 1989

Comment·

Explain or reword the sentence "Remediation of the destruction of the building is required "

Disposition

Paragraph 9 6 was revised to clarify the referenced statement

Comment·

Reference the Decommissioning Resource Manual and all other references used in the document Change the location of "References" to the last section or an appendix

Disposition.

Moved references to Appendix 5

Comment:

Remove the sentences dealing with the Large Scale Demonstration Project due to the recent RFETS decision on its cancellation, unless that has changed

Disposition

A definite decision on the large scale Demonstration Project has not been made

Comment:

Describe/explain "Standard Work Practices", perhaps in the dictionary

Disposition.

This reference has been clarified

Review Comment Sheet
Ray Daniels, DNFSB - Comments to 12/18/96 Draft 779 DOP

Comment:

Page 8, Recent decisions by DOE HQ have concluded that a new SNM vault will not be constructed at RFETS, but at SRS

Disposition

This statement has been removed from the document

Comment:

Page 9 Environmental Cleanup Standards similar to Trenches T3 and T4 - Is 85 mrem/yr the correct std? Should it be the EPA Std of 15/75 mrem/yr as cited on P 27?

Disposition:

The 85 mrem per year is the correct standard (action level) and is discussed in the RFCA, Section 3 7 , The Action Level and Standards Action levels for radionuclides in surface soil is based on the 15/85 mrem per year dose limits Per RFCA, the use of radiation dose to develop action levels is consistent with EPA's draft 40CRF 196, Radiation Site Cleanup Regulations

Comment

Page 20, Section 3 3 Makes no mention of the Decommissioning Resource Manual (DRM) which is a key element in the revision tot he LCAM Order 430 1 currently undergoing revision in HQ to be completed in draft by Feb 97, making the DRM a mandatory requirement for all D&D activities at DOE sites

Disposition:

Appendix B, Section 1 0, Decontamination Options, of the revised (9/25/97) 779 Cluster DOP references the DRM

Comment

Page 23, Change "contaminates" to contaminants "

Disposition

This change has been made

Comment·

Page 25, Section 4 3 HASP - Shouldn't the HASP contain all the hazards by area on the site? It can include by reference other citations such as the "RCLR" cited for Pu release and criticality hazards

Disposition

The 779 HASP is a generic document that provides guidance for Activity Hazard Analysis (AHA) The AHA is performed for each non-routine task/activity A core working group will evaluate the AHA prior to performing the area specific work thus ensuring adequacy Physical and administrative safety controls are then integrated in to the IWCP

Comment:

Page 29, Section 5 1 Appendix I table does not contain a column of whether the DPP or a DOP is expected to govern decommissioning the facility

Disposition·

The DOP has been designed as a "stand alone" document in the absence of a regulator approved DPP

Comment

Page 36
a Define "rollup" in Pu consolidation row
b Under Comments column next to Waste Processing it states "only waste operations within the decommissioning area need to be completed " This approach limits the flexibility needed to achieve the desired endpoints, e g B771 Stabilization activities conducted under REC 94-1 promised to drain and flush lines, but these lines were not flushed after draining, leaving the legacy for cleanup to deactivation when work could have been done in a more cost effective fashion These commitments were made to the Board during a presentation of how REC 95-2 would be implemented at the RFETS > It was repeated in September 1996 during a Board visit to the Site, yet it was not followed through to satisfactory completion

Disposition

a Reference to plutonium "rollup" has been deleted from the most current revision to the DOP

b The scope of work associated with the 779 DOP that was reviewed by you on 12/6/96 was quite limited Present scope of work includes demolition of the complete Cluster (excluding basements) within 2 years

Comment

Page 43, Section 6 Technology Why not reference the Decommissioning Handbook as a recent resource for demonstrated techniques?

Disposition

The Decommissioning Handbook is referenced in Appendix B of the 779 DOP (revision 9/25/97) as a resource for demonstrated techniques

Comment

Page 10, Section 1 2 2 1 Insert "critically" before safe-diameter in last line

Disposition

This statement was deleted in subsequent revisions to the 779 DOP

Comment

Page 15, Section 1 2 2 3 4 Last paragraph OSA should be OSHA

Disposition

This typo was corrected

Comment:

Page 16, Section 1 2 3 This section does not describe equipment operations but does describe utilities in Appendix 1 not Appendix A

Disposition

This error was corrected

Comment

Page 24, Section 3 2 2nd bullet refers to section 7 0 instead of section 8 0 Waste Management It is not clear how the trade off between decontamination cost and disposal cost will be made It is nor elaborated upon in Section 8 0

Disposition

Estimates of the cost associated with survey for "free release" and/or decontamination will be performed on a piece by piece basis RCTs are very familiar with the amount of time required to survey a piece of equipment The 779 Cluster Decommissioning Team has some decontamination cost estimate data available from other decommissioning projects There will be certain instances where decontamination will be performed even though it is not necessarily cost effective (in order to meet specific waste acceptance criteria for a TSD), but other instances where no decontamination or an extensive survey will be performed For example, if the cost associated with surveying a piece of equipment to meet radiological "free release" criteria, for instance, significantly exceeds the cost to waste a piece of equipment, then the piece of equipment will be disposed of as a waste

Clarification has been incorporated into the present revision to the DOP

Comment.

> Page 71, Section 7 1 4 Have we seen the Health and Safety Practices manual? I would like to see the "building specific safety plan" which supplements the HSPM for all concerns in the building

Disposition·

The Health and Safety Practices Manual and the 779 HASP will be provided at your request

Comment

> Page 71, Section 7 1 5 What is HSP 2 11? Is it the HASP mentioned in 7 1 4 above?

Disposition

HSP 2 11 is Section 2 11, Job Safety Analysis, of the Health and Safety Practices Manual

Comment.

> Page 72, Section 7 0 Last paragraph - do we have a copy of RMS - 004?

Disposition

This training procedure will be forwarded to the DFNSB

Comment

> Page 74, Section 7 6 1 Do we have HSP - 3 03?

Disposition

This procedure will be forwarded to the DFNSB

Comment.

Page 77, Section 8 7 Has the disposition of B779 been defined? Will interim storage of TRU and LLW occur in B779 during the 10-year period for this vision? Is this addressed in the RFCA or in ASAP 2?

Disposition:

Formal dispositioning of the 779 Cluster will be determined by the Site Utility Disposition Board (SURB) To date, the Cluster will not be used as an interim storage facility but will be demolished within 2 years The RFCA does not identify the 779 Cluster as an interim storage facility and this pilot project will be used to demonstrate the DOP process The Lead Regulatory Agency (LRA), specifically CDPHE has been integral to planning this decommissioning project

Comment

Page 79, Section Table 8 1 Headings are misleading Estimated Room Area is in ft^3 Does this mean the quantity of waste or equipment/material to be generated in the cited Totals in a line do not total up

Disposition·

This header may be considered misleading It is the estimated volume of overall waste and materials in the room

Comment:

Page 83, Section Table 8 2 Total number of gloveboxes is 47 in B779 with lead epoxied or bolted on

Disposition:

This is a correct statement

Comment.

Page 86, Section 9 2 4th line, should this be "interaction" or "inaction?"

Disposition.

Corrected

Comment·

Page 89, Section 9 3 1st sentence, Wouldn't the upcoming revision to the LCAM Order 430 1 be a TBC?

Disposition

This is being evaluated

Comment.

Page 76 , Section 8 2 Definition of LLW is incorrect Delete "or equal to" and insert "transuranic" before radioactivity

Disposition:

Corrected

Comment.

Page 147, Appendix 2 Section 1 0 lst line "excepted" should be Excerpted " Decommissioning Handbook As a result many typos are generated Why not state the preferred approaches and the potential ones and refer to the Handbook? Throughout this document the word "contaminates" is used when Contaminants" is meant

Disposition

Corrected

Comment.

Page 171, Appendix 3 Suggest summarizing the salient room with their Pu holdup

Disposition

This information has been summarized in Appendix 3

Review Comment Sheet
Rick DiSalvo - Comments to 12/18/96 Draft DOP

Comment

Note Here are my preliminary comments I still need to formulate comments on section 9-12, but they will be along the lines of our conversation last week

1 pg 22 Organization Chart - Shouldn't QA Engineer have (at least) dotted line responsibility to ESH&Q Manager? See 2 1 6 functional description

Disposition

There should have been a dotted line connecting the QA engineer to the ESH&Q manager This has been corrected on the organization chart

Comment:

2 pg 24, fifth bullet - POLICY/LOGIC ISSUE Must "RFCA end state" be met before dismantling the building ? I think it is advisable that dismantling may be done in lieu of decontamination if more cost effective What contamination levels and types of contamination controls will be acceptable for dismantling contaminated portions of 779? RFFO would like to see safe alternatives to "free release" as option to allow dismantling structure For example, fixative coatings and containment housing may be preferable to labor intensive, time consuming physical decontamination in some instances See pg 59 Section 5 1 which also is limiting us to meet final standards before demolition

Disposition:

The RFCA and state must be met

The Building Radiation Cleanup Standards, (BRCS) committee is currently working on this issue (Section 5) The committee will determine how to relate the RFCA values to a building contamination level

The RFCA cleanup standard applies to the items which are to remain in place or left onsite It does not apply to radioactively contaminated equipment and materials which are removed, packaged and sent offsite for long-term storage or disposal Section 5 1 was modified to include this discussion

Comment·

3 Section 5 0, Cleanup Standards - NOT ADEQUATE DOP needs specificity One key reason for the DOP is not only to agree on the cleanup numbers but also the way to measure whether we have met the numbers We cannot just say "in accordance with" some policy or guide, or employing procedures "such as" those that might be in use today Compliance with a standard will be based on lots of assumptions about exposure scenarios and final building disposition

What about hazardous substances other than those mentioned? I assume we want a risk based cleanup standard? If so, what is and what techniques are we proposing for analysis? For example, we may not be able to verify certain piping runs free of contamination and it may be expensive (or structurally inadvisable) to rip the system out of a concrete wall or floor Can we agree on an analysis technique that verifies system drained and calculated residuals do not pose risk above agreed to level?

Disposition·

Section 5 1 has been modified to clarify by adding additional detail There are current two working group trying to identify endpoint numbers for decommissioning to modify RFCA, with the current absence of a ROD for the site The removal process is not a remedial action and receives no ROD It is an interim action that was intended, as specified in 40 CFR 300 415(b)(2)(i-viii) and summarized in (b)(3), to abate, prevent, minimize, stabilize, mitigate, or eliminate the threat to public health or welfare or the environment Thus, removal actions, 415(c), shall to the <u>extent practicable</u> [no standards, only good value for the money spent toward final cleanup

Contribute to the effective performance of any anticipated long-term action with respect to the release concerned

Comment

4 Section 6, Authorization Basis - POLICY/LOGIC/LEGAL ISSUE (This section is very poorly written, so I'm not really sure what is being proposed or weather it will be applied as apparently intended) Nuclear operational safety is not the purview of CDPHE or EPA (unless there exists a substantial threat of release to the environment which must be alleged by EPA) DOE retains authority for SAR and AB administration, so long as these are required by AEA DOE will need to maintain these requirements independent of RFCA requirements

Instead, just base this section on the engineering and procedural controls that are in place and need to be maintained to minimize risks to workers, the environment and the public from radioactive and other hazardous materials contained in the building In Appendix 4A remove the Nuclear Safety Requirement heading and move Downgrading Criteria to Nuclear Safety Control column See attached markup This way the DOP will incorporate what is necessary to do the work safely, and what is enforceable under DOP (which upon approval is incorporated into RFCA) without confusing DOE's prerogatives over specific nuclear safety requirements

Change Appendix 4B per attached markup

Need to be more specific on downgrading criteria For example, what does "removal of <u>all</u> loose surface contamination" actually mean? Is it less than 20 DPM/100 sq cm alpha?

Redraft this section to just address nuclear safety controls It can analogize to current AB systems and how key elements of the system can be successfully employed in the DOP criteria

Finally, perhaps this section can be incorporated into section 7 0

Disposition

This section has been rewritten A Basis of Interim Operations (BIO) has been developed to replace the existing SAR The BIO was written to identify when specific requirements are no longer applicable This will allow stepping down and eliminating the TSRs

Comment·

5 Section 7, Health and Safety - Mentions OSHA in Scope section, but this is really part of specific implementation policy Doesn't scope include environmental protection?

The listing of RFETS HS&P Manual should go in an Appendix for reference, otherwise these are incorporated into RFCA and are enforceable

What about the H&S Plan already approved under IAG and now incorporated into RFCA? Why not use it?

Disposition

The Scope Section has been clarified as suggested The RFETS HASP approved under the IAG was used to develop the job specific HASP for this project The job specific HASP is required by HSP 24 01

Comment.

6 Section 8 Waste Management - LOGICAL/LEGAL ISSUES This section should mention that waste estimates, process knowledge and analysis and controls will be one of the objectives of characterization surveys that are discussed in Section 4

Are there any RCRA interim status units that need to be closed? If so, identify them and discuss closure requirements Any Idle Equipment Management Plan that consists of hazardous waste? Need to recognize these wastes

The DOP must address the Land Disposal Restriction status of the expected mixed wastes and the treatment capacity and options for non-LDR compliant wastes This is a requirement of the Site Treatment Plan Compliance Order

Will there be any hazardous/mixed waste treatment? We may need to have in-container treatment of decontamination solutions of chemicals and decontamination of hazardous debris as part of the decommissioning plan, for example These issues must be addressed

<u>Delete the last line of Section 8 9 regarding FY'98 funding.</u>

Disposition

Section 8 has been modified to address your concerns

Comment

7 Section 9 1 - I'm not sure we need first paragraph It doesn't ad anything and way it's written needs too much wordsmithing In second paragraph, 40 CFR 300 815 should be 40 CFR 300 415

Disposition

This section was modified to reflect your corrections

Comment:

8 Section 9 2 - First paragraph has too much fluff Just say that RFCA regulates decommissioning (I like the 4th line, where it refers to "regulator inaction")

In second paragraph, first line should say DOP follows the IM/IRA approval process, since I think that's what is being described

I suggest that the information in Section 9 1 and 9 2 go into an introductory section before what is now Section 1 There is no up front information for the reader/reviewer about why the DOP exists in relation to the regulatory framework The draft DPP format is probably better in this regard But, keep it short and to the point

Disposition:

This section was modified to reflect your corrections

Comment

9 Section 9 3 ARARs - POLICY/LEGAL ISSUE ARARs only apply to remedial actions, "with respect to any hazardous substance, pollutant or contaminant that will remain onsite" CERCLA section 121 (d)(2)(A) The NCP, 40 CFR 300 415 (h)(i) requires ARARs to be attained in (non-time critical) removal actions, so NCP extends the CERCLA section 121(d) requirement beyond remedial actions The idea is that remedial actions should be consistent with the final remedy, and in many cases the removal can be the final remedy, thus the need to attain ARARs

Decommissioning is being conducted as a CERCLA removal, and not as the final remedy The ARAR discussion must be tailored to tour removal plans For decommissioning, our plan is to ultimately remove the buildings and dispose of any contaminated components in an offsite disposal facility However, we might want to leave structures standing as free released, or dispose of contaminated rubble onsite The only ARARs that must be addressed are the final cleanup standards for all hazardous substances, pollutants or contaminants that will remain onsite

We need to identify, i e propose, which standards are applicable and which are relevant and appropriate If a standard is applicable, then you don't need any duplicative relevant and appropriate standards The point is that if some requirement doesn't cover the subject i e , nothing legally applicable, then shoal back to relevant and appropriate standards to try and cover the situation In addition because the relevant and appropriate standards are applied by analogy, they are subject to negotiation and the led agency is not constrained by underlying statutory or regulatory authority

Therefore, the table must identify what standards are legally applicable and what standards are relevant and appropriate and must be limited to those scenarios where contaminants will remain onsite at the completion of the removal

As presently drafted, the table confuses the requirements that are applicable in the conduct of the work, with the standards to be met when the removal is completed All legally required standards must be followed in the conduct of the work (except that administrative environmental permits are not required) Requirements of DOE orders (or agreed to "necessary and sufficient" standards incorporated by contact), 10 CFR 835, RFCA, etc are already directly applicable ARARs should only address the cleanup standards, e g , the 15 mrem/year rad standard and its statutory/regulatory basis, PCBs, lead, asbestos, etc

Note that RFCA incorporates a number of (hopefully) more efficient methods to allow operational requirements to be reviewed and agreed to, e g , identification and approval of air emissions or RFCA closure activities as part of the removal action But these are not ARARs

Need to proofread page 97, there are several incorrect words used in the 40 CFR 300 5 definitions In first paragraph, "NCP" is written twice Fourth paragraph, which ends in work "not" is confusing "Are not" what? Probably just delete, since next paragraphs say it over again

Delete last clause, paragraph at tope of page 88 IAG is extinct

Disposition

The first citation in CERCLA (sec 121(d)(2)(A)) is for remedial action only ARARs for removal actions are identified in the NCP If it had meant removal actions, they could not have exempted this requirement The second citation provided in this paragraph is for funded action by the state or political subdivision removal actions, which this is not this type of action(see 415(h)) Thus, ARARs do not apply to this action and has been identified for clarity and to avoid confusion

Comment:

10 Section 9 4 and 9 5, Environmental Issues and Permit Impacts - LOGICAL/LEGAL ISSUE These are the appropriate sections to address the requirements that are not ARARs but are to be coordinated under RFCA Section 9 5 says "an evaluation will be conducted" The DOP must provide the results of the evaluation and provide all information that allows regulator review and approval or out analysis of air, water, RCRA, etc , issues that governed by State or Federal law Although, we don't need permits for onsite CERCLA actions, we must meet the informational requirements of the applicable

law For example, any information required in APENS, RCRA closure plans, NPDES is needed now for approval

Revise the section to meet RFCA, requirements in this regard See RFCA paragraph 66 and RFCA Part 98 generally Much of what is listed in the ARAR table is based on substantive law, e g , AEA, that must be followed during cleanup and are not ARARs

Disposition

This section was rewritten to reflect the scoping stage of regulator's input and a review of the draft document by members of the lead regulatory agency

Comment.

11 Section 10, Quality Assurance - POLICY/LEGAL ISSUE I'm not a QA expert, but it seems to me that this section should present the specific QA Program Plan for the work It should tier off of the approved ER QA plan incorporated into RFCA If that plan needs to be revised to accommodate elements that were not incorporated because it was drafted and approved before decommissioning was contemplated, then that's what should be done Just citing the RMRS QAPP is not sufficient, since to my knowledge is never been reviewed and approved by RFFO or the regulators

This section should identify all QA elements and sub-elements that apply to the work and how they will be implemented For example, a critical element should be "Control of Inspection and Testing Equipment - e g how will portable instruments be calibrated, field checked and controlled? What will be the testing and/or calibration frequency? What documents will be maintained? Who will be authorized to use this equipment? This element is critical to ensure the data collected is legally sufficient and legally defensible to certify the decommissioning standard has been met The QA plan should already have these elements listed The QAPP merely needs to specify which of the elements are applicable The NRC regulatory guidance for decontamination and decommissioning is instructive in this regard Section 10 3 8 tries to recognize this issue, but falls far short

Disposition

This section will be revised to address compliance with the site RFETS QAP

Comment

12 Glossary - If the DOP is going to have a glossary (and I'm not sure it needs one) at least make the definitions accurate and helpful For example, they define "dose" in rads, when the units of import for the DOP are mrems per year? Based on a brief reading nearly every definition involving hazardous waste, radioactive materials and radiation is not technically accurate Also, the definitions are not the same as those in RFCA for decommissioning, deactivation, etc Please have someone familiar with the topics edit this

Disposition:

This section removed

Comment:

13 Acronyms - Are all of the listed acronyms really used in the DOP? I don't, think so, e g PRP, SDWA DO a complete scrub of this list

Disposition:

The Acronyms List has been revised

Review Comment Sheet
Art Flewelling, QA RMRS - Comments to 12/18/96 Draft DOP

Comment

Pg 64 section 8 1 State that TRU and TRU Mixed Waste will be generated, characterized and packaged in accordance with the RFETS TRU Waste Management Plan and the RFETS WIPP Waste Characterization QA Project Plan

Disposition:

Added as suggested

Comment

Pg 64 Section 8 2 State that LL and LLM Waste will be generated, characterized and packaged in accordance with the RFETS Low Level Waste Management Plan

Disposition.

Added as suggested

Comment

Pg All Section All Significant number of spelling and typographical errors encountered throughout document (i e , 16 errors Pages 52 and 53)

Disposition:

Corrected

Comment

Pg 11 & 14 section 2 1 6 QA Engineer should be shown on org chart w/dotted line to ESH&Q Manager Also, in text the QA Manager reports to the ESH & Q Manager

Disposition

Revised as suggested

Review Comment Sheet
Fred Gerdemen DOE/RFFO/PCD- Comments to 12/18/96 Draft DOP

Comment

Although improved from the previous version, this document is still not acceptable for the reasons discussed in the following comments

1) Still does not explain the relationship of the hazards and risks to the work scopes (activities) and schedule needed to meet the end points Appendix 3 helps, but still lacks sufficient information to understand the relationship of the work to the hazards and risks

2) The environmental and waste sections are better, but still do not provide the basic required information

3) Lacks specific goals and schedule for reducing surveillance and maintenance and for AB reduction

4) Since the deactivation work is not completed and the scope seems to change without explanation and apparently can be changed to fit unnamed circumstances, this DOP should specify how the scope and estimate will be changed to accommodate the shifting end points Also, schedule impacts that may be caused if the endpoints are not reached for critical path activities should be discussed

Disposition.

1) Section 3 1 2 and Appendix B of the DOP identify the potential radiological and chemical hazards which may be encountered in each of the areas within the 779 Cluster Section 3 2 of the DOP identifies the general approach to the decommissioning activities The 779 Cluster Health and Safety Plan (HASP) contains the initial project exposure assessment which was developed from the review of these DOP sections In addition to the initial exposure assessment more task specific evaluations (activity Hazard Analysis - AHAs) are completed with and become part of the work packages

The safety analysis (Basis of Interim Operations - BIO) will become part of the new Authorization Basis contains accident analysis for the 779 Cluster decommissioning effort and TSRs were written to be eliminated as the conditions no longer require this implementation In addition, Section 9 4 has been revised and now contains the results of hazards analysis completed for the decommissioning activities at RFETS

2) The environmental and waste management section have been revised Additional detail regarding the revisions are provided in the responses to follow

3) Section 6 0, Authorization Basis Transition, has been revised to more accurately reflect how the surveillance and maintenance functions will be reduced as the 779 Cluster hazards are reduced

4) To ensure the deactivation end points were succinctly identified and met the decommissioning team is completing detailed walkdowns of the 779 Cluster The team has generated a room by room, cabinet by cabinet inventory of equipment, parts, tools, instruments, chemicals, and other miscellaneous items (inside as well as outside gloveboxes) The inventory was then converted into an end points document which defines who is responsible (deactivation or decommissioning) for disposition of the item These endpoints are an attachment to the 779 Cluster Work Summary Plan and have assisted in scoping the decommissioning effort In addition, the deactivation end points have been used to refine the Equipment Removal section of the decommissioning Work Breakdown Structure

Comment:

> 2 The scope of the DOP is not clear Sometimes only B779 is mentioned, other times the cluster in included Many examples including the waste estimated which do not appear to include all structures in the cluster

Disposition

The DOP was reviewed and some sections were changed to help clarify the difference between the 779 Cluster and Building 779 Building 779 is the major facility within the 779 Cluster and Building 779 contains the greater amount of hazards Therefore by using a graded approach in the DOP, the majority of the discussions are focused on Building 779 The waste estimate tables have been revised to include all the 779 Cluster facilities

Comment

> 3 The cost estimates and basis should be included - preferably in an appendix

Disposition

A discussion of the schedule and cost estimates has been added in Section 12

Comment

> 4 Due to the potential for the proposed privatization and/or Large Scale (technology) Demonstration to impact the scope, schedule, budget, as well as environmental protection, ARARs, etc they must be discussed in sufficient detail to ensure the regulators and the public can determine the extent of any impacts

Disposition·

Some discussion of privatization on the Large Scale Technology Demonstration has been added but, there is too much uncertainty in how either of them will be implemented to put very much definition in the DOP The ARARs are required by CERCLA and are independent of how the work is completed and who completes the work

Comment

5 There does not appear to be good information/lessons learned exchanged between the authors of this DOP and the 886 DOP based on the recurring deficiencies and issues

Also, there are still numerous typographical, spelling and grammatical errors Most are not identified in these comments, but I will lend the authors my marked up copy of the DOP which has many of them highlighted

Disposition.

There is no exchange of information as Building 886 does not have a DOP being developed The Building 886 Work Summary Plan (WSP) is in the final steps of being developed The intent of the WSP and DOP are different and therefore the content of each would be different

The DOP will be reviewed for spelling and grammar errors before the next issue

Comment

6 The Working Group should review the draft guidance on content and format requirements for Remedial Design Reports, and consider integrating it into the DOP format

Move Section 3 (overview) ahead of Section 2 (organization and responsibilities)

Disposition:

The remedial Design Report format is not implimentable in its current configuration and will not be used in its current configuration and will not be used for the 779 Cluster DOP Section 1 0 has been modified and provides additional project overview The sequence of Section 2 and Section 3 remain the same

Comment

7 Delete "interim status" insert "non-time critical " (No such thing as interim status under CERCLA)

Also, state that the DPP is still a draft being worked on by the Facility Disposition Working Group

Disposition·

Section 1 1 has been revised to delete the use of "interim status "

The DOP has been revised to act as a stand alone document in lieu of the draft status of the DPP CDPHE has requested that the DOP contain the elements necessary to act as a stand alone document

Comment.

8 Show 779-1 and -B, since they are discussed in 1 2 2 See also comment 11

Disposition

Modified Figure 1 2 to show 779-A and 779-B

Comment

9 Identify and name the figure using standard format

Same question as before - Is waste operations responsible for hazardous material as well as hazardous waste?

Disposition·

The organization chart has been labeled

The Waste Operations Support personnel are responsible for Hazardous Material and Hazardous Waste as used and generated by the project

Comment

10 Indicate what activities were formerly done what are done now (Note This version is much improved with regard to differentiating the ongoing and future activities from those that are no longer done, but the entire DOP still needs to be scrubbed)

Disposition

There are no R&D related operations being completed in Building 779 Section 3 1 1 has been modified to reflect this fact

Comment.

11 Could not find Building 779-2 on Figure 1 2 Need to go through document to ensure that all named buildings related to this cluster are shown on the figure

Disposition

Reference to 779-2 was of no added value therefore it was deleted

Comment.

12 This section is generally not adequate for the reader to understand the risks or hazards It needs more descriptive information and terminology should be standardized Terms like "most extreme hazard," " high contamination," "low

contamination," "no appreciable amounts," "dirty and contaminated," "hot spot," "most abundant contaminant," etc used throughout the DOP are meaningless and indicate inadequate QA/QC was applied to the characterization or the summary is poorly written or both Quantify or define the levels and/or define the risk of hazard As stated in comments on the earlier draft, this section should be put into table format to facilitate the risks and hazards being compared to decommissioning work to be performed

Disposition

The terms identified were meant to give a relative feeling for radiological contamination and not a quantifiable assessment Unless the general public had a background in health physics the difference between 1,000 decays per minute plutonium and 2,500 decays per minute plutonium would not mean much A description of contamination area and high contamination area however does signify that there are probably different controls for the two areas The DOP has been reviewed and an attempt to use consistent terminology has been made

A quantifiable hazard assessment of the 779 Cluster Decommissioning activities has been added to Section 7 in table format Section 9 4 discusses hazards due to decommissioning in a more quantifiable manner The Basis of Interim Operations (BIO) discusses potential accidents and their consequences Reference Section 6 0 for a discussion of the 779 Cluster BIO In addition to these hazard assessments, each decommissioning task will be assessed using an AHA

Comment

13 State what was done to characterize paint, cables, fluorescent light ballasts, small capacitors, etc for PCBs and where they were found

State how many transformers contains PCBs in regulated concentrations, what the concentrations are, and location(s)

Disposition

Representative sampling of painted surfaces will be performed in the 779 Cluster No transformers in the 779 Cluster contain PCBs although one PCB contaminated transformer

Comment

14 Same comment as on earlier version - Always define what the "contamination" consists of (Pu, Po, U, Asbestos, PCBs, or combinations) There are numerous examples of where this classification is needed

Disposition

Revised DOP to indicate the type of contamination in all locations where appropriate In some cases the term contaminate is meant to be any undesired substance

Comment

15 What is the scope of "miscellaneous equipment and systems?" Does this mean all equipment and systems? Define

Do you mean "i e " vs "e g "?

Disposition.

Clarified the statement and corrected the e g reference

Comment:

16 Similar comment to #12 These sections discuss radiation sources having been stored in the rooms, but no mention is made as to whether known or suspected releases occurred and leaves the reader wondering if further assessment or action is needed

Disposition.

The statement has been changed to indicated the sources were removed from the building Even if the sources were removed a radiation survey and visual search for sources will be completed

Comment.

17 Blank

Disposition

N/A

Comment·

18 What kind of batteries - Pb, NiCd? A few pounds or tons of them? Leaking or intact? Waste or not waste? Hazardous waste now or in the future?

Second paragraph, replace "qualified" with "regulated"

Was the tank system including all ancillary equipment closed, or was this a partial closure? Is there any work or regulatory issue remaining?

Disposition:

The statement has been modified to indicate the Pb-acid batteries were removed from the building during deactivation Changed qualified to regulated Tanks was fully closed No further action is required

Comment.

19 Will the crucibles, tantalum, and ceramics be removed during deactivation or decommissioning? If not during deactivation, why?

Disposition·

These will be removed during decommissioning Deactivation has stated that unless the item inside the gloveboxes are chemicals, SNM or beryllium, the item's removal is not in their scope of work

Comment.

20 Is the RCRA unit closed or will it be closed during deactivation or decommissioning? Closed or partially closed?

Disposition:

The satellites accumulation area in room 153 will be closed during decommissioning The satellite accumulation area in room 155 will be closed during deactivation These comments were added to Appendix 3

Comment·

21 Discusses actions to be taken during decommissioning, which does not follow the existing format

Also, the use of temporary ventilation should be covered as a KNOWN activity in the regulatory analysis section

Disposition

Added the use of temporary ventilation to Section 3 2 3 Moved the statement in question from 3 1 2 57 to Appendix 3

Comment·

22 Is there any possibility the contaminated equipment might be removed from 779 to another location for size reduction? If yes, modify to allow for doing so

Disposition:

Yes The section has been modified to clarify this point

Comment

23 State when you're going to remove Pb and PCB contaminated pain Discuss timing for ACBM removal Also, state if all idle equipment has been completely drained of hazardous material waste (not just operationally empty) If not empty,

state when that will be done Is all waste from this activity included in the waste estimates? When do the PCB transformers and any capacitors and ballasts get removed?

Disposition

The sequence of removing asbestos was identified on page 42 Added the potential for removing lead and PCB painted surfaces The idle equipment fluid will be drained and flushed as necessary during deactivation No hazardous fluids should be in Building 779 when it is released for decommissioning The light ballasts will be removed when lights are removed All wastes are in table 8 1 estimates

Comment:

24 If the DQO process was used to complete the characterization, state how it was used If it was not used, state what method was used

Disposition

See Section 4 1 2 for description of process used

Comment

25 See suggested editorial changes on my copy of the draft

Disposition

Section 4 1 and 4 2 have been revised

Comment:

26 Was any additional sampling done?

Disposition:

No Additional sampling was done solely for decommissioning Additional routine radiation surveys and holdup ventilation measurement were made

Comment

27 Define "contaminant" It is often not clear if it mean potentially released, Potential Contaminant of Concern, or actually released For example, is the CO-60 source really a contaminant or is it just a hazardous material that needs special handling? Is there evidence of a PCB release from the transformers or are they contained as required in the transformers?

Did the calciners or furnaces burn chlorinated solvents, and, if so, was the possibility assessed that they could have soot or filters containing dioxins, dibenzo-furans, or other toxic products of incomplete combustion?

Why was the CO-60 source not removed during deactivation, since its removal was one of the end points?

See earlier comment that there appears to be inadequate characterization of PCBs especially in paints, compressors, fluorescent light ballasts, and small capacitors

Disposition·

The DOP was modified to identify specific contaminants as appropriate In some places the generic item contaminant is still used

There is no record of a PCB release in the 779 Cluster

? Dioxins

The CO-60 source will be removed during decommissioning

Added Section 4 7 to discuss the sampling for PCBs

Comment.

28 Need to explain that the characterization in 4 3 6 are all parts of the characterization listed in paragraph 4 1 Consider moving them as subsections into a new Sections 4 2 call "Types of Surveys" or something similar and change the current paragraph 4 2 to 4 3 Also, need to define "survey" to differentiate from "characterization" and other terms

Disposition·

This section has been revised to clarify the phases of characterization and how characterization relates to sampling and surveys

Comment·

29 Do the characterization procedures already exist? If not say if they'll be developed and when

Disposition·

Procedures exist that provide guidance on how to sample and track (chain of custody) samples A characterization procedure which helps to identify where to look for a particular contaminant and how to determine sample locations does not exist A Decommissioning Characterization Protocol procedure has been drafted and is in the review process The procedure when approved will fill this gap

Comment:

30 Change file to "documentation of Characterization Results" or similar

Disposition

Changed title as suggested

Comment.

31 Will the referenced sampling procedure for samples from an RBA/CA be used for samples outside an RBA/CA? If not, what will be used? If yes, this would appear to be overkill and another, less strenuous procedure should be used

Disposition:

The referenced sentence has been removed The requirement for chain of custody tracking has bee retained L-6245-F "Sampling Procedure for Waste Characterization Report " is used outside RBA

Comment

32 Referencing paragraph 4 1, which report is the "brief characterization report?"

Disposition

The reference to a "brief" characterization report has been deleted A summary of each sampling event will be contained in the sample instructions This method of instruction development is contained in the new (drafted) Decommissioning Characterization Protocol Procedure

Comment·

33 This section is seriously deficient, and it remains inadequate

The phrase "most abundant contaminants" is unclear Use a technically valid phrase

Also, cite the reference that states that the cleanup criteria for only the most abundant contaminants should be included Otherwise include the criteria for all in this section

Disposition

Section 5 has been modified to more clearly indicate criteria which will be used for release of the facility

Comment:

34 This sub-section is improved over the previous version Please verify the applicability of the EDB to equipment

Disposition

The EDE applies to the facility as left in place If the scope of the project is not changed, no equipment will be left in place

Comment:

35 Double-check the release criteria for BE Confirm the "action level" is equivalent to the free release level

Disposition

This section has been modified slightly The 25 ug sq /ft triggers housecleaning actions as identified in the site HASP

Comment.

36 Include ACM in the list of acronyms and distinguish it from ACBM by defining both Otherwise, standardized use of the term

What WBS element is funding the asbestos work that will be done prior to decommissioning? Is the work defined in the B779 WSP?

Disposition.

ACM was added to acronyms list

Asbestos is removed under the Dismantlement WBS definition For building 779 the WBS# is 1 1 06 14 04 03 05

Asbestos will be removed prior to activities which would disturb it Asbestos removal is not part of deactivation

The asbestos is not part of deactivation and therefore not defined in the WSP

Comment

37 Use of the DOP as the AB authorization is unlikely at this time Based on conversations with the RFFO AB group, the draft DIP is significantly below the level of quality that would allow this At a minimum, a fallback position should be stated with specific information on schedule or budget impacts

Are all of the conditions in table 6 1 directly applicable to 779

Disposition

The AB approach (and Section 6) has been modified to use a BIO as the new AB

The conditions in table 6 1 are only applicable to B779

Comment

38 Specify what "local and city regulations" apply to decommissioning operations involving 779 and say how they will be complied with If any are applicable, is compliance with them covered in existing procedures?

Disposition

The only known requirements is to obtain a demolition permit The need to comply with this under CERCLA is being reviewed

Comment

39 The objective is not to "establish" a goal of zero lost time accidents it should be to meet the goal

Disposition

Changed sentences as suggested

Comment:

40 State where and how enhanced work planning is used for decommissioning Clarify if "work Instruction" is the same as IWCP

Disposition:

Section 7 1 5 was modified as suggested

Comment

41 State who is responsible for ensuring the personnel are trained in accordance with the requirements matrix How often do they check the qualifications? What happens if someone is not trained - cannot work? Work under supervision?

Disposition:

Revised 7 3 1 to identify the job foreman as the person responsible to ensure training is complete The project manager is the person who is complete The project manager is the person who sets the requirements and is tasked with overall compliance Work is not complete with untrained personnel

Comment

42 Define "most extreme hazard "

Disposition:

Section 7 4 1 has been modified for clarification

Comment

43 Describe how the sire air and water quality monitoring is related to work area monitoring Is the data shared with the decommissioning project manager or used otherwise? How? Why? When?

Disposition.

The sire air and water quality monitoring are backup checks for the work area monitoring The site program is not used to replace work area monitoring When the building containment (building/structure) is removed the site monitoring is the sole source of release information Personnel from the air and water quality groups are part of the project Input to the project planning and implementation is direct from the project team members

Comment·

44 Double-check the definition of "mixed waste " It is doubtful that it is only included if it contains "RCRA constituents" vs the same criteria stated in definition in paragraph 8 4

Disposition.

Changed "RCRA" to "hazardous "

Comment

45 This section is not adequate it lacks the needed specificity for this very important subject

Disposition·

Section 8 6 has been expanded and now addresses bulk building materials Add reference to the guiding document for waste minimization

Comment·

46 This section is not adequate It lacks specific information It does not provide any level of confidence that the waste generated can be managed and disposed

It is not clear what is meant by the statement that the waste strategy will be approached on a room by room basis Please describe the overall strategy for waste management for B779 Include where and for how long waste will be stored before it is disposed

Describe the process and the regulatory constraints and impacts (including reference to any existing procedures) for managing each waste type during the transition from deactivation to decommissioning and then from decommissioning to offsite shipment or disposal in a CAMU (I had the same comment on the B886

DOP, so to save work you might want to check with Bob Gance at x1508 to see if they've addressed it)

Costs for waste management should be included in the budget estimate (which needs to be included in the DOP), but the costs should be shown separately to distinguish what the cluster is funding vs what is funded by the waste management program

Disposition·

Section 8 7 has been expanded as suggested

Comment.

47 A similar section is needed to discusses removal and disposal of excess equipment, because it may be of nearly equal importance

Disposition

Discussion of equipment management has been added to Section 8 7

Comment

48 Excess chemical removal is an end point stated in the WSP If they are not removed, the DOP should describe why not and include the scope and the cost for removing them

Disposition·

All excess chemicals were removed during deactivation

Comment:

49 This table is not acceptable This is the DOP, the CERCLA decision document, so these should be no TBDs, much less the large number shown in the table

It does not appear that the wastes from the entire cluster are included, and the title only says that it is B779 Include the waste estimates for the entire cluster and include the management costs in the total estimate

Briefly describe how the estimates were prepared For example, why is bulk waste for structural elements like walls and ceilings, not included in most estimates? The table should include solid, non-hazardous waste (unsalvageable equipment, supplies, debris, etc) and an explanation of how it will be managed and disposed

Disposition:

Table 8 1 has been modified as suggested The details of how the waste estimates were generated has been added to Section 8 7

Comment·

71 Isn't CDPHE the LRA?

Disposition

Section 9 2 was changed to state "LRA, EPA and public "

Comment.

72 See comments from Rick DiSalvo

Disposition·

Rick DiSalvo's comment are being responded to independently of these comments

Comment.

73 The statement that the DOP includes NEPA values needs to be assessed by the RFFO NEPA Compliance Officer As written, it does not appear to address key NEPA-like issue, such as, waste management impacts including storage, transportation, and disposal and associated environmental impacts, air quality impacts, cost of the project compared to benefits and impacts, analysis of alternatives (would deactivating or only partial decommissioning be the preferred alternative), impact of tearing the facility to ground, but not immediately doing the ER work, etc)

The air issues section remains unacceptably vague The evaluation should have been completed and the results reported in this DOP As written, this does not appear to meet the requirements of FCA for discussion of permits needed or not needed because the project is being done under CERCLA

The number and location of RCRA units in not evident State how many existing units will be needed by the decommissioning program, which ones and why (See related comment #46) Will all units be closed or only partially closed Are any associated with IHSSs or extend beyond the boundaries of the building? the cluster?

Disposition·

Section 9 4 has been re-written to better address these concerns Added to address status of RCRA and IHSS areas

Comment

74 This section remains incomplete Same comments as before The analysis should already be completed and included in this DOP

Disposition

Section 9 5 has been revised

Comment

75 Clarify what is meant by, "Remediation of the destruction of the building is required "

Disposition

This section has been re-written

Comment.

76 This section provides some good information mixed with a large amount of generic, promotional verbiage Significantly cut the excess

Disposition:

Section 10 has been modified to eliminate some verbiage

Comment:

77 Who approves the contractor's plans and when? Who determines if the equivalency requirements is met and what standards do they use? Reference the QA/QC procedures that apply How is graded approach applied toe review?

Disposition

K-H Procurement Quality assurance is responsible for approving subcontractors quality plans when requested by RMRS

Comment·

78 See comment #41

Disposition

Training requirements for project personnel are identified in the project specific training matrix The Decommissioning Program Training Plan, RMRS 004, identifies how training requirements are set up and tracked For Quality Assurance personnel, the QA Manager administers the qualification requirements, on a yearly basis

Comment·

79 Despite the glowing statements about the quality and thoroughness of the QA program, its effectiveness is questionable State the program's specific responsibility for the quality of this draft DOP, and list what documents the QA staff is responsible for reviewing and when they are required to perform the reviews (or summarize the QAPP's requirements)

Disposition·

QA has assisted in the development of the DOP and has reviewed and commented on the document in its entirety RMRS controls its documents per site document control procedures and internal procedures, (ref IWCP, 1-MAN-001-SRM, RMRS-QA-05 01)

Comment.

80 The format needs to be changed for the appendices, so the section numbering is not the same as that used in the body of the document

Will the fuel oil tanks be removed during decommissioning Are they included in the work scope and cost?

Disposition.

The appendix numbering has been changed to start with the appendix letter

The installed underground diesel fuel oil tanks are currently being replaced by aboveground tanks The underground tanks will be cleaned, flushed and foamed by the Underground Tank Replacement Project Removal of the aboveground storage tanks are part of the 779 Cluster Decommissioning Project

Comment·

81 This section is not clear as to the contamination type

What new technologies will be assessed by the LSD, where will they do the work, what will the impacts be on scope, schedule, budget, and the environment, health and safety of workers and the public?

This section needs a decision tree that narrows the selection of the technologies that will be used for decontamination It is too broad as written

The criteria given here for the decision on whether or not to decontaminate is not an exact match with the criteria in the waste minimization Section (8 6) Establish and state the criteria Also, the scope and budget need to reflect the requirement in RFCA for all readily removable radioactive contamination to be removed

Disposition.

The use of "contamination" in this context is meant to be general and cover different types of contaminants

The technologies to be used for the LSD have not been selected The impact to scope, schedule and budget can not be assessed until the technologies and their application have been determined

this appendix is to provide an overview of different technologies The specific technology to be used is discussed in Section 3, (i e strippable paint, rags and scabbling)

Section 8 6 has been revised The term "readily removable radioactive contamination" is to be determined with the LRA as the project proceeds Since this is not totally defined ahead of time, there is some uncertainty in scope, schedule and budget

Comment:

82 What is the basis for the statement that some form of decontamination is needed in any decommissioning program?

Disposition

As explained in Section B1 0, much of the material in Appendix B is directly out of the DOE Decommissioning Handbook The statement in question is from the handbook

Comment:

83 Are strippable coatings applicable to highly porous substrates?

Disposition

The applicability to highly porous substrates is dependent on the desired outcome The strippable paint can be used to help fix contamination as well as remove it

Comment

84 Types of contamination appear to be arbitrarily shortened For example, why aren't all of the contaminants included? Expand to include them or explain the reasoning for leaving them out

Disposition

The Appendix 3 characterization list is a summary of the more detailed Reconnaissance Level Characterization information The contaminants were listed because they are the ones expected to result in the most impact to the project's scope

Review Comment Sheet
Chris Gilbreath DOP - Comments to 12/18/96 Draft DOP

Comment:

The DOP references existing programs and plans at the Site for most activities to be performed under decommissioning Do these programs and plans adequately address decommissioning activities? For instance, virtually all waste management decisions during decommissioning are made by the Waste Management Programs using the existing Waste Management Plan I am not convinced that the Program has developed a detailed plan for properly packaging, staffing, storing and disposing of generated wastes from B779 Has a plan(s) been developed to answer the following questions where is the waste going to packaged, where will it be stored, how long will the waste remain on-site, how much can be generated before storage space is no longer available, what disposal sire will be used, what are the backup disposal sites? I would like a copy of this plan(s) prior to issuing the DOP for public comment/review

What is the end point for deactivation? Are all excess chemicals removed prior to decommissioning activities? Is the 779 Decommissioning project one of the 29 Kaiser-Hill projects? If not, how does the project and project managers interface and coordinate with the larger project(s)?

Disposition

The programs and plans reference in the DOP consist of procedures or processes which are adequate to cover all the planned decommissioning activities in the 779 Cluster *The DPP contains an overview of the RFETS waste management process* Section 8 12 was added to indicate how the 779 Cluster waste will be managed within the RFETS Infrastructure

The deactivation endpoints are covered in the 779 Cluster Work Summary Plan The 779 Cluster Decommissioning is part of the Ten Year Plan

Comment

2 1 1 Project Manager A decommissioning training requirements matrix and industrial and safety plans and controls should already be in place Therefore, the PM should <u>maintain</u> not establish these plans In addition, the matrix and safety plans should be available for review upon request

The project manager should also maintain interface with the entire Waste Management program including hazardous, solid, and other wastes, not just radioactive

Disposition

A new training matrix is made for each project per RMRS-004, Training Procedure And a job specific HASP is developed for each project per HSP 24 01 These plans are available for review

Deleted the word "radioactive" from the responsibilities description as suggested

Comment

2 1 9 Regulatory Compliance Engineer Does this person act as the regulatory liaison as well?

Disposition:

The Regulatory Compliance Engineer is the projects regulatory liaison

Comment.

3 0 Area Descriptions and Planned Activities Several rooms/gloveboxes/areas identify actual or potential contamination, what type of contamination is present? Radioactive only? It would appear from the descriptions that there may also be chemical contamination in several rooms/gloveboxes/areas as well

Disposition:

The DOP was modified to indicate the type of contamination which was being addressed Primarily the contamination is radioactive As a part of good housecleaning practices, if a chemical was spilled or started to build up, the chemical would have been cleaned up Visual examination of the majority of the rooms indicates that this was true There are, however, as you indicated, some areas with chemical residue

Comment

3 1 2 4 B779, Room 126 Provide a copy of the RFCA closure certification for T-5

Disposition:

The T-5 closure information is available for review but it adds no value to integrate the closure certificate into the DOP

Comment

3 1 2 22 B779, Room 142 Provide a copy of the RFCA closure certification for Room 142

Disposition:

Section 3 1 2 22 was incorrect and has been modified The room was a satellite accumulation area for fluorescent light bulbs and is not a permitted area

Comment

> 3 2 3 Description of Decommissioning Operations Is asbestos present in B779? Is this based on surveys and/or process knowledge?
>
> Piping systems and equipment will be drained, isolated and locked out/tagged out prior to any work on the system/equipment Is this a deactivation activity or a decommissioning activity?
>
> Gloveboxes, B-boxes and hoods - do you intend to perform a hazardous constituent analysis?

Disposition:

Asbestos is present in Building 779 Initial characterization is based on process knowledge and is being confirmed through sampling The system draining and LO/TO is being performed by decommissioning Characterization will be conducted to ensure proper handling of the waste which is generated

Comment

> 4 0 Facility Characterization How will deactivation and decommissioning characterization be coordinated? Who is responsible?

Disposition

All deactivation characterization information will be provided to decommissioning This is being coordinated by the project manager The transfer of information is required by the deactivation plan

Comment.

> 4 2 Reconnaissance Level Characterization Survey Is it true that no heavy metals are present (i e , cadmium, chromium)? What was this determination based on?

Disposition:

Deactivation personnel sampled equipment suspected of containing hazardous (constituents) materials, such as RCRA metals, and drained/flushed the equipment, as appropriate, for the Idle Equipment Program RCRA metals which may be contained in paint have not been sampled This will be completed during the In-Process and Final Characterization

Comment.

4 6 Lead Characterization Identify written procedures by title and date for lead characterization

Disposition

HWRM-03 provides the guidelines used by personnel to identify waste characterization and constituents such as lead The requirements of EPA SW-846 are followed to determine the concentration of metals in solids L-Procedures are used to implement the analysis on site

A Decommissioning Characterization Protocol Procedure is being developed (currently in draft) to assist in decommissioning specific characterization

Comment:

4 7 Documentation Hazardous material contaminant characterization - per what procedure? Available upon request?

Disposition:

1-C75-HWRM-03, Waste Identification and Analysis, is available upon request

Comment.

5 2 Equipment Unconditional Rad Release Criteria The DOP states that decommissioning activities will comply with DOE Order 5400 5 or 10 CFR Part 834 when approved, what is the criteria? At a minimum, the DOP should give a summary

Disposition.

Section 5 2 has been revised to include the information requested

Comment·

5 3 Beryllium Release Criteria What RFETS policies and procedures? What does the 25 ug action level mean? For all equipment? How is it measured?

Disposition·

HSP 13 04 is the Beryllium Protection document and identifies the 25 ug/sq ft as a housecleaning action limit (Other guidance is being developed to assist in releasing material which is contaminated or potentially contaminated with beryllium) The procedural requirements for beryllium sampling are contained in the Decommissioning Characterization Protocol

Comment

> 7 1 4 Technical Resources and Approach Building specific safety plan - available? Why not included in the DOP?

Disposition

The DOP is a public review document So to make the HASP more flexible the preference is to have it as a stand-alone document

Comment:

> 7 1 5 Job Safety Analysis - completed, available?

Disposition

There are multiple Activity Hazard Analysis(s) (AHA) The AHAs are completed as the task instructions are developed Some AHAs are available for review

Comment

> 8 8 Waste Characterization What established procedures? I would like to see a copy of the revised WSRIC for B779 Where will the waste generated from decommissioning activities be stored? For how long? How much waste can be generated until no storage space is available? What are the assumptions? Again, are all excess chemicals going to be removed during deactivation?

Disposition.

Copies of the Waste Management procedures have been forwarded to CDPHE A copy of the 779 Cluster WSRIC is available Please request WSRIC from K-H

The DOP has been revised to contain an overview of the RFETS waste management process

Excess chemicals were removed during deactivation

Comment:

> 8 9 Interim Storage, Transporting and Final Disposition Site Waste Management Program - what is the plan? Who is in charge of the program? Are the waste management plan(s) complete and available? How have they been modified for D&D activities? What is the final disposition of the waste to be generated? Backup plans for disposal?

Disposition

Martin Wheeler, RMRS Vice President of Waste Management Division, is in charge of the WM Program

The existing waste management procedures will be followed for decommissioning The procedures do not need to be modified for D&D because the procedural requirements are independent of how the waste was generated

The ultimate final disposition of radioactive waste is offsite shipment

The backup position to offsite shipment is storage outside the PA Storage in the 779 Cluster as a last resort

Comment.

> Table 9 1 ARARs - Subtitle C Hazardous Waste Management Closure and Post-Closure This section should state that closure of RCRA units will occur in accordance with their approved closure plan The proposed closure plan in the RFETS permit reapplication proposed that specific information regarding individual permitted unit closures will be contained in a Closure Decision Document to be submitted as part of a decision document (in this case DOP) This closure Decision Document will provide, at a minimum, information on and rationale for the method of closure, the type of closure, the type of contamination, the decontamination method(s) and media to be used, the schedule for accomplishing closure, and other information associated with permitted unit closure activities As written, the 779 DOP does not contain this type of information

Disposition·

The closure description document can be submitted as a part of the RFCA decision document or with submittal of a closure notification The closure description document for the 779 Cluster RCRA units will be submitted with a closure notification

Comment

> 9 2 RFCA The LRA for the 779 Cluster is CDPHE

Disposition

Clarified Section 9 2 as suggested

Comment·

> 9 4 Environmental Issues Waste management plan and B779 WSRIC book available for review?
>
> Appendix 3 Characterization Survey and Work Summary Matrix Add column for Chemical/Hazardous Constituent contamination

Disposition

Section 9 4 has been re-written

The Waste Management Procedures have been forwarded to CDPHE

The WSRIC is available for review

Appendix 3 was meant to be a summary of the constituents which would have the most impact the work and not a historical list of all potential contaminants

Review Comment Sheet
Richard Graham, EPA - Comments to 12/18/96 Draft DOP

Comment:

General Overall well done and thought out technically and scientifically Must continue to realize the general public will review document We should continue to stress clarity, conciseness, and try to explain approaches, assumptions, as clearly as we can Explain that we will continue to stress H&S, criticality if needed and characterization of contaminants, D&D is an interactive cycle Spelling needs to be checked throughout the document as well as general table(s), figure(s) and text appearance

Disposition

Introduction revised to stress continued evaluation of health and safety considerations and characterization during the course of the building decommissioning

Spelling and text appearance will be reviewed

Comment.

Pg 16 Section 1 2 3
No Appendix A in Section

Disposition·

Corrected

Comment:

Pg 24 Section 3 2 1
Last Bullet - "(cleaned)" - we need to explain "clean" and "wiped down" earlier in this chapter or explain how we will meet stat's for "clean "

Disposition·

Housekeeping activities are not intended to meet a quantifiable standard This effort is performed as part of routine industrial activities Specific cleanup criteria are provided in Section 5 0

Comment:

Pg 25 Section 3 2 1 2d
Second bullet What about sludges, crud in pipes, etc pipes 1st decon and cleaned before capped?

Disposition:

In general, piping remaining in place will not be decontaminated prior to capping The piping will be addressed in future environmental restoration Piping that is contained in the buildings will be removed during decommissioning will be appropriately characterized and removed using standard decommissioning techniques that are protective of workers and the environment Typically the piping will not be decontaminated because it is not cost effective

Comment.

Pg 26 Section 3 1 2 1
Process drain will be capped in place? SNM concerns? criticality? Organic vapors etc ?

Disposition

Below grade piping will be capped in place Consideration of SNM and organic vapors will be addressed via characterization

Comment

Pg 26 Section 3 2 2 4
Rm126 - define "appreciable" less than TRU?

Disposition.

Discussion of TRU waste classification has been clarified and is located in Section 8 1

Comment:

Pg 35 Section 3 2 2 25 5th Paragraph
Will Co-60 be shipped in a container? Sealed Source? Radiography "source like"?

Disposition

The details for the removal of the CO-60 source will be contained in an IWCP It is expected that the source will be transferred to a shielded, DOT approved shipping cask The source will be dispositioned to a licensed vendor for reuse/recycle

Comment

Pg 36 Section 3 2 2 26 5th Paragraph
Editorial delete "and" in last sentence to read "in down throughout the using "

Disposition

Editorial comment incorporated

Comment.

Pg 171 Appendix 3
We see Be, PCBs, Rad etc - RCRA chemicals/Listed or characteristic Wastes?

Disposition

The intent of Appendix 3 is to identify potential work area hazards This information will be used for waste classification, but additional characterization may be required

Comment.

Pg 54 Section 4 1 1st Paragraph
We use "Unconditional" to mean "free release " Be consistent, use one term explain it, and use it again, SP "exist" to "existing" information

Disposition

The term "unrestricted release" will be used throughout the document A definition of the term similar to that provided in MARSSIM will included "Unrestricted Release Release of a site or building from regulatory control without requirements for future radiological restrictions Also known as unrestricted use "

Comment:

Pg 54 Section 4 1
Recon Survey "Refer to Paragraph 4 2" added This small Paragraph doesn't explain survey, next page does explain what the Recon, Process, Final Decon Surveys are

Disposition·

A reference to Section 4 2 was included in this section

Comment:

Pg 55 Section 4 1
Who is the "3rd Party" for final verification survey?

Disposition·

The organization responsible for selecting and managing the "3rd Party" survey needs to be defined by DOE or LRA Possible candidates include DOE, CDPHE or the decommissioning contractor Typically, Oak Ridge Institute of Science (ORIS) performs the verification survey for facilities decommissioned under NRC

Comment:

Pg 56 Section 4 2

Bullets - DQOs bullet sets up and defines our survey/sampling plans - change this order if bullets

Disposition·

DQO bullet moved

Comment

Pg 57 Section 4 3
Will lab equipment be used for analysis or will only field, in- situ, survey techniques equipment be used?

Disposition

Additional words added to Section 4 3 to address comment

Comment:

Pg 57 Section 4 5
Spell out "Be" to start sentence

Disposition

Change made

Comment

Pg 58 Section 4 7
Will all sample locations (smears or samples), sample #s, sample results all be located together in one document or report? Can we compare samples to location taken and results at the end of the verification surveys to ascertain "clean"?

Disposition

All survey sample and data will be available whether in the Project Administrative Record or in radiological survey data files The samples can be related to the sample location and sample results obtained A final survey report will be produced at the end of the project summarizing the data collected

Comment·

Pg 59 Section 5 1
Use of Draft NUREG (NUREG 1575) also draft Multi Agency Radiological Site Sampling Manual (MARSSM) should be cited and used DQOs also direct ever sampling/surveillance procedures

Disposition:

Reference to MARSSIM included

Comment:

Pg 59 Section 5 2
DOE draft reg 10 CFR 834 has been pulled from OAB review This sentence maybe unnecessary

Disposition·

The reference to 10 CFR 834 is currently in RFCA

Comment

Pg 59 Section 5 2
Be release level of 25mg/ft^3 - arrange concentration or is this maximum What area is this value averaged over? Similar to rad technologies (1m^2, 10m^2)?

Disposition

The limit for Be unconditional release is currently under review by K-H If necessary more specific guidance will be added to this section

Comment·

Pg Appendix 4
Define category 2, 3, facility(ies) for public before talking about them

Disposition

This comment was missed in the April revision Comments will be incorporated in the next revision

Comment

Pg 76 Section 8 2
Free release, uncontained release, etc Define terms and stick with one

Disposition:

The definition for unconditional release will be included

Comment

Pg 76 Section 8 3

Do we want to talk about "storage" of LLW mixed wastes Politically sensitive issue Instead use some verbiage used on page 78, last paragraph and last sentence Stored on-site until shipped for final disposal

Disposition:

Comment incorporated

Comment.

Pg 77 Section 8 6
Waste minimization process used throughout D&D process However it appears only in one phase Clarify waste minimization practices that will be implemented from reconnaissance survey through final verification process/survey

Disposition:

Additional clarification on waste minimization practices has been added to Section 8 6

Comment·

Pg 77 Section 8 8
WSRIC is new to most people Do we need to clarify and expand WSRIC and where it come from, how it was developed, etc ?

Disposition.

Comment incorporated More details on the WSRIC process will be

Comment·

We need abbreviations/Definitions section in this table to define "RGA" and "Cold", etc

Disposition

Clarification of terms incorporated

Review Comment Sheet
Timothy L Hunt, DNFSB - Kaiser Hill - Comments to 12/18/96 Draft DOP

Comment

Page 2, last paragraph Define the acronym "BEMR" - and any other acronym for that matter - the first time used

Disposition

Corrected

Comment

Page 7, general assumptions How is the actual funding figure of $537 million for FY97 affected by assumption of $600 million

Disposition

The project believes it will be fully funded

Comment

Page 10, NEPA Topics Add effects on land (geologic, seismic), noise, aesthetic, scenic resources, traffic and transportation, utilities and energy, waste management

Disposition

Incorporated

Comment

Page 12, Table 2 2 Change table number and title on all 7 page, revise 10 CFR 834 sections 102 to 201, 11 to 104, 203 to 213 Subpart D to G, 10 to 7, and delete Part 834 references to TRU waste and surface water discharge

Disposition

Corrected

Comment

Page 19, Figure 3 1 Identify figure as "Figure 3 1 "

Disposition

Corrected

Comment

Page 24, Section 4 2 Other items that could contain lead are brass, bronze and solder, asbestos are gaskets and cabling, PCBs are old rubber products and paint Other contaminants of concern include mercury, silver and chromium

Disposition

Noted The primary sources of contaminants have only been identified

Comment

Page 25, Section 4 3 Doesn't seem like the first paragraph (critically) belongs in this section The third paragraph should better define the HASP, e g , "The HASP analyzes hazards, establishes operational controls, and establishes appropriate safety management programs (may also want to reference EM-STD-5503-94 as HASP implementation guide)

Disposition

This section has been clarified

Comment

Page 26, Section 4 4 1 Where is section 5 18 3 referenced in last sentence? Should it be 4 4 3 RFETS vision statements?

Disposition.

Deleted

Comment

Page 27, Section 4 5 What is "Vision" referred to in Line #9?

Disposition:

Clarified

Comment.

Page 29, Section 5 Reference to Page 43 should be changed to Page 32

Disposition

Corrected

Comment:

Page 43, Section 6 1 The decontamination equipment should be added to Section 6 3

Disposition.

Decontamination equipment and methods are described in Appendix A

Comment

Page 44, Section 6 2 Break volume reduction categories into Metal (add nibblers, shears, abrasive cutters, flame cutters, etc), Compactibles, and Concrete (add wall and floor saws, diamond wire, core drilling, blasting, wrecking ball, water jet, etc)

Disposition

Noted

Comment·

Page 45, Section 6 5 Are you going to add contamination control measures?

Disposition

Yes

Comment

Page 48, Section 9 To the definition of Decommissioning add " and prior to environmental restoration " at end of first sentence To definition of Dismantlement add " building, system, component, or structure "

Disposition·

Corrected

Comment

All Pages Check grammar and spelling

Disposition

Corrected

Comment:

Table of contents Incorrect title for Appendix 3 and missing Appendix 4 (cross reference from B779 SAR/OSR to DOP)

Disposition

Corrected

Comment

Page 5 Should state up front the reason that Building 779 - not a "major" facility as described in the MOU or RFCA - is having a DOP developed to decommission it

Disposition:

Clarified

Comment

Page 5, Section 1 1 Try not to invent new words like "projectized "

Disposition

Noted

Comment

Page 8, Section 1 1 Provide picture that shows all buildings in cluster and check that Building 787 (should be B786 A &B?) is properly identified

Disposition:

Provided

Comment

Chapter 1, section numbering is confusing

Disposition

Fixed

Comment:

Page 16, Section 1 2 3 Where is Appendix A?

Disposition

In the back of the document

Comment.

Page 16, Section 1 2 2   Move title to Section 1 2 2 on page 97

Disposition

Corrected

Comment:

Page 23, Section 3 1   Can't find any endpoint criteria in Section 4 0 as specified

Disposition

Endpoint criteria are defined in the Work Summary Plan for Deactivation

Comment·

Page 23, Section 3 2   Environmental Engineering should be included in the engineering walkdowns

Disposition

It is

Comment

Page 25, Section 3 2 2   A layout of building with room numbers included would be helpful in this section

Disposition

The document would be classified as UCNI in the event that this information was added to the document

Comment.

Page 25, Section 3 2 1   Fifth bullet, all newly exposed surfaces should be surveyed for loose surface contamination

Disposition

Noted

Comment

Page 25-49, Section 3 2 2 Seems to be a lot of rooms missing (119, 120, 136, 221, 229, 230, 231, 232, 145, 146, 149, 151, 161, 162, 165, 167, 167A) Are all these captured under Section 3 2 2 56?

Disposition·

All room are captured Note that all rooms numbering is not necessarily sequential and that event airlocks and halls have a room number

Comment

Page 64 & 65 Move to Appendices section

Disposition·

Noted

Comment.

Page 71, Section 7 1 4 What is the title of the "building specific safety plan?"

Disposition.

The 779 Cluster Health and Safety Plan is the project specific document in question

Comment·

Page 109, Section 1 2-2 Part of sketch is missing

Disposition

Corrected

Comment

Page 119, after section 1 2 8 Why no descriptions of Buildings 784, 785, 786, 787?

Disposition

These have been included

Comment

Appendix 2 Confusing section numbering system Most of this information can probably be deleted and just referenced as being available in the Decommissioning Handbook Additional columns for whether sampling is required, estimated quantities of hazardous materials to be generated, and waste stream/disposal method would be useful

Disposition

Updated